OM-4426 215 348T

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Processes

MIG (GMAW) Welding

Flux Cored (FCAW)

Stick (SMAW) Welding

TIG (GTAW) Welding

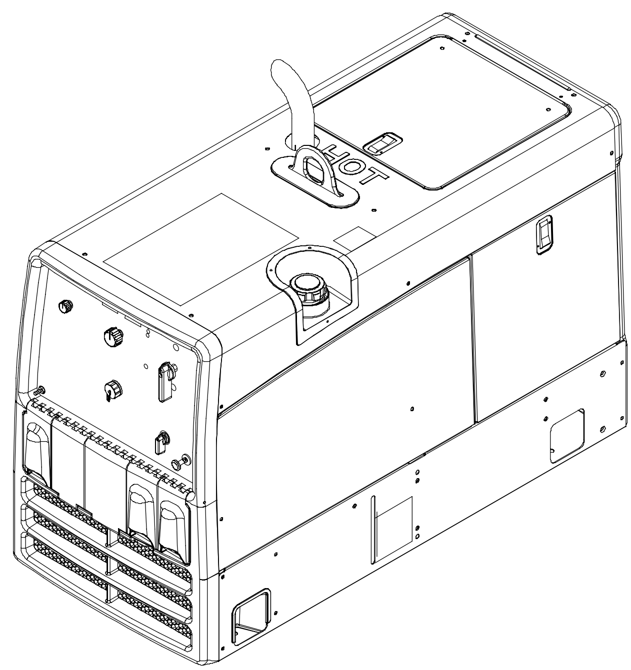
Air Plasma Cutting and Gouging with Spectrum® Unit

Air Carbon Arc (CAC-A) Cutting and Gouging

Description

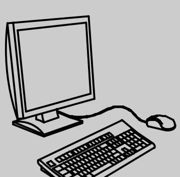
Engine Driven Welding Generator
(AC Available On AC/DC Models Only)

Trailblazer® 302
Trailblazer® 275 DC



OWNER'S MANUAL

File: Engine Drive



Visit our website at

www.MillerWelds.com

From Miller to You

Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

ISO 9001:2000 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001:2000 Quality System Standard.



Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual specification sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**

TRUE BLUE® WARRANTY

Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

Miller®

TABLE OF CONTENTS

TABLE OF CONTENTS

SECTION 1 – SAFETY PRECAUTIONS – READ BEFORE USING

▲ **Warning: Protect yourself and others from injury — read and follow these precautions.**

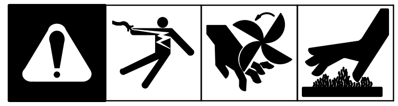
1-1. Symbol Usage



Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means “Note”; not safety related.*



This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Arc Welding Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-7. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**



ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, use the following equipment in order presented: 1) a semiautomatic DC constant voltage (wire) welder, 2) a DC manual (stick) welder, or 3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner’s Manual and national, state, and local codes.
- Always verify the supply ground — check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring — replace cord immediately if damaged — bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

SIGNIFICANT DC VOLTAGE exists in inverters after stopping engine.

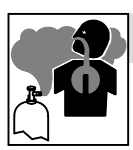
- Stop engine on inverter and discharge input capacitors according to instructions in Maintenance Section before touching any parts.



FUMES AND GASES can be hazardous.

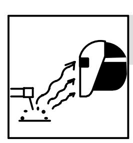
Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove welding fumes and gases.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Material Safety Data Sheets (MSDSs) and the manufacturer’s instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



BUILDUP OF GAS can injure or kill.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



ARC RAYS can burn eyes and skin.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

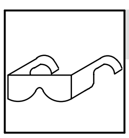
- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash, glare, and sparks; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather, heavy cotton, or wool) and foot protection.



WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Do not weld where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



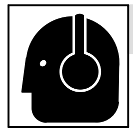
FLYING METAL can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.



HOT PARTS can cause severe burns.

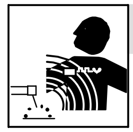
- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.



NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.



MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.

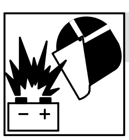


CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

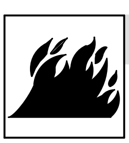
- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder — explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures, and sufficient number of persons to llift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.

1-3. Engine Hazards



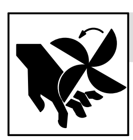
BATTERY EXPLOSION can BLIND.

- Always wear a face shield, rubber gloves, and protective clothing when working on a battery.
- Stop engine before disconnecting or connecting battery cables or servicing battery.
- Do not allow tools to cause sparks when working on a battery.
- Do not use welder to charge batteries or jump start vehicles.
- Observe correct polarity (+ and −) on batteries.
- Disconnect negative (−) cable first and connect it last.



FUEL can cause fire or explosion.

- Stop engine and let it cool off before checking or adding fuel.
- Do not add fuel while smoking or if unit is near any sparks or open flames.
- Do not overfill tank — allow room for fuel to expand.
- Do not spill fuel. If fuel is spilled, clean up before starting engine.
- Dispose of rags in a fireproof container.
- Always keep nozzle in contact with tank when fueling.



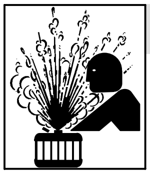
MOVING PARTS can cause injury.

- Keep away from fans, belts, and rotors.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Stop engine before installing or connecting unit.
- Have only qualified people remove doors, panels, covers, or guards for maintenance and troubleshooting as necessary.
- To prevent accidental starting during servicing, disconnect negative (−) battery cable from battery.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Reinstall doors, panels, covers, or guards when servicing is finished and before starting engine.
- Before working on generator, remove spark plugs or injectors to keep engine from kicking back or starting.
- Block flywheel so that it will not turn while working on generator components.



HOT PARTS can cause severe burns.

- Do not touch hot engine parts.
- Allow cooling period before maintaining.
- Wear protective gloves and clothing when working on a hot engine.



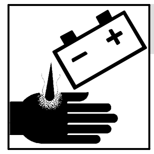
STEAM AND HOT COOLANT can burn.

- If possible, check coolant level when engine is cold to avoid scalding.
- Always check coolant level at overflow tank, if present on unit, instead of radiator (unless told otherwise in maintenance section or engine manual).
- If the engine is warm, checking is needed, and there is no overflow tank, follow the next two statements.
- Wear safety glasses and gloves and put a rag over radiator cap.
- Turn cap slightly and let pressure escape slowly before completely removing cap.



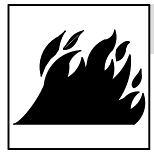
ENGINE EXHAUST GASES can kill.

- Use equipment outside in open, well-ventilated areas.
- If used in a closed area, vent engine exhaust outside and away from any building air intakes.



BATTERY ACID can BURN SKIN and EYES.

- Do not tip battery.
- Replace damaged battery.
- Flush eyes and skin immediately with water.



ENGINE HEAT can cause fire.

- Do not locate unit on, over, or near combustible surfaces or flammables.
- Keep exhaust and exhaust pipes way from flammables.



EXHAUST SPARKS can cause fire.

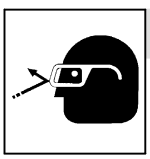
- Do not let engine exhaust sparks cause fire.
- Use approved engine exhaust spark arrestor in required areas — see applicable codes.

1-4. Compressed Air Hazards



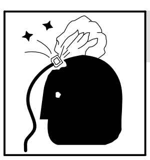
BREATHING COMPRESSED AIR can cause serious injury or death.

- Do not use compressed air for breathing.
- Use only for cutting, gouging, and tools.



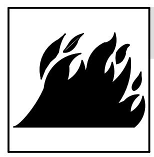
COMPRESSED AIR can cause injury.

- Wear approved safety goggles.
- Do not direct air stream toward self or others.



TRAPPED AIR PRESSURE AND WHIPPING HOSES can cause injury.

- Release air pressure from tools and system before servicing, adding or changing attachments, or opening compressor oil drain or oil fill cap.



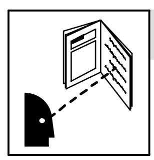
HOT METAL from air arc cutting and gouging can cause fire or explosion.

- Do not cut or gouge near flammables.
- Watch for fire; keep extinguisher nearby.



HOT PARTS can cause burns and injury.

- Do not touch hot compressor or air system parts.
- Let system cool down before touching or servicing.



READ INSTRUCTIONS.

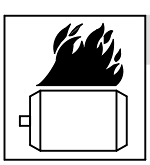
- Read Owner's Manual before using or servicing unit.
- Stop engine and release air pressure before servicing.
- Use only genuine Miller/Hobart replacement parts.

1-5. Additional Symbols For Installation, Operation, And Maintenance



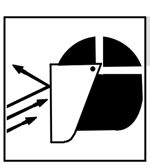
FALLING UNIT can cause injury.

- Use lifting eye to lift unit and properly installed accessories only. Do not exceed maximum lift eye weight rating (see Specifications).
- Lift and support unit only with proper equipment and correct procedures.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



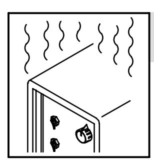
OVERHEATING can damage motors.

- Turn off or unplug equipment before starting or stopping engine.
- Do not let low voltage and frequency caused by low engine speed damage electric motors.
- Do not connect 50 or 60 Hertz motors to the 100 Hertz receptacle where applicable.



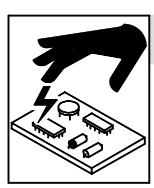
FLYING SPARKS can cause injury.

- Wear a face shield to protect eyes and face.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Sparks can cause fires — keep flammables away.



OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



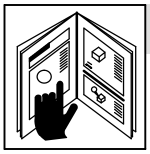
STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



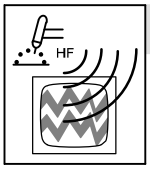
TILTING OF TRAILER can cause injury.

- Use tongue jack or blocks to support weight.
- Properly install welding generator onto trailer according to instructions supplied with trailer.



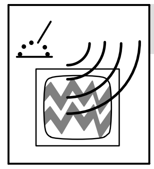
READ INSTRUCTIONS.

- Use only genuine MILLER/Hobart replacement parts.
- Perform engine and air compressor (if applicable) maintenance and service according to this manual and the engine/air compressor (if applicable) manuals.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as microprocessors, computers, and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

1-6. California Proposition 65 Warnings

▲ **Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**

▲ **Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.**

For Gasoline Engines:

▲ **Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

For Diesel Engines:

▲ **Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.**

1-7. Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping, American Welding Society Standard AWS F4.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org and www.sparky.org).

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1735 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102 (phone: 703-412-0900, website: www.cganet.com).

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3 (phone: 800-463-6727 or in Toronto 416-747-4044, website: www.csa-international.org).

Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 11 West 42nd Street, New York, NY 10036–8002 (phone: 212-642-4900, website: www.ansi.org).

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org.

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (there are 10 Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov).

1-8. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: “The body of evidence, in the committee's judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard.” However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

Pacemaker wearers consult your doctor before welding or going near welding operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

rom_fre 3/05

▲ **Avertissement: Protégez vous et les autres des blessures – lisez et suivez ces précautions.**

2-1. Signification des symboles



Signifie Mise en garde ! Soyez vigilant ! Cette procédure présente des risques de danger ! Ceux-ci sont identifiés par des symboles adjacents aux directives.

▲ **Identifie un message de sécurité particulier.**

☞ *Signifie NOTA ; n'est pas relatif à la sécurité.*



Ce groupe de symboles signifie Mise en garde ! Soyez vigilant ! Il y a des risques de danger reliés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

2-2. Dangers relatifs au soudage à l'arc

▲ **Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 2-7 . Veuillez lire et respecter toutes ces normes de sécurité.**

▲ **L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.**

▲ **Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.**



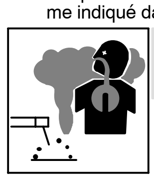
UN CHOC ÉLECTRIQUE peut tuer.

Un simple contact avec des pièces électriques peut provoquer une électrocution ou des blessures graves. L'électrode et le circuit de soudage sont sous tension dès que l'appareil est sur ON. Le circuit d'entrée et les circuits internes de l'appareil sont également sous tension à ce moment-là. En soudage semi-automatique ou automatique, le fil, le dévidoir, le logement des galets d'entraînement et les pièces métalliques en contact avec le fil de soudage sont sous tension. Des matériels mal installés ou mal mis à la terre présentent un danger.

- Ne jamais toucher les pièces électriques sous tension.
- Porter des gants et des vêtements de protection secs ne comportant pas de trous.
- S'isoler de la pièce et de la terre au moyen de tapis ou d'autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.
- Ne pas se servir de source électrique à courant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique à courant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique à courant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- Des précautions de sécurité supplémentaires sont requises dans des environnements à risque comme: les endroits humides ou lorsque l'on porte des vêtements mouillés; sur des structures métalliques au sol, grillages et échafaudages; dans des positions assises, à genoux et allongées; ou quand il y a un risque important de contact accidentel avec la pièce ou le sol. Dans ces cas utiliser les appareils suivants dans l'ordre de préférence: 1) un poste à souder DC semi−automatique de type CV (MIG/MAG), 2) un poste à souder manuel (électrode enrobée) DC, 3) un poste à souder manuel AC avec tension à vide réduite. Dans la plupart des cas, un poste courant continu de type CV est recommandé. Et, ne pas travailler seul!
- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installer et mettre à la terre correctement cet appareil conformément à son manuel d'utilisation et aux codes nationaux, provinciaux et municipaux.
- Toujours vérifier la terre du cordon d'alimentation − Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Vérifier fréquemment le cordon d'alimentation pour voir s'il n'est pas endommagé ou dénudé − remplacer le cordon immédiatement s'il est endommagé − un câble dénudé peut provoquer une électrocution.
- Mettre l'appareil hors tension quand on ne l'utilise pas.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct − ne pas utiliser le connecteur de pièce ou le câble de retour.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- Ne pas toucher des porte électrodes connectés à deux machines en même temps à cause de la présence d'une tension à vide doublée.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

Une tension DC importante subsiste à l'intérieur des onduleurs après avoir coupé l'alimentation.

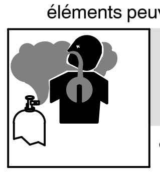
- Couper l'alimentation du poste et décharger les condensateurs d'entrée comme indiqué dans la Section Maintenance avant de toucher des composants.



LES FUMÉES ET LES GAZ peuvent être dangereux.

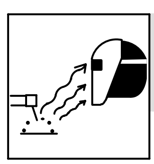
Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- À l'intérieur, ventiler la zone et/ou utiliser une ventilation forcée au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est médiocre, porter un respirateur anti-vapeurs approuvé.
- Lire et comprendre les spécifications de sécurité des matériaux (MSDS) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur à alimentation d'air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l'air et abaisser le niveau d'oxygène provoquant des blessures ou des accidents mortels. S'assurer que l'air de respiration ne présente aucun danger.
- Ne pas souder dans des endroits situés à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
- Ne pas souder des métaux munis d'un revêtement, tels que l'acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n'ait été enlevé dans la zone de soudure, que l'endroit soit bien ventilé, et en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.



LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.



LES RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

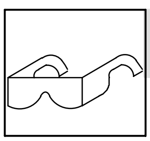
- Porter un casque de soudage approuvé muni de verres filtrants approprié pour protéger visage et yeux pendant le soudage (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des lunettes de sécurité avec écrans latéraux même sous votre casque.
- Avoir recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements les éblouissements et les étincelles ; prévenir toute personne sur les lieux de ne pas regarder l'arc.
- Porter des vêtements confectionnés avec des matières résistantes et ignifuges (cuir, coton lourd ou laine) et des bottes de protection.



LE SOUDAGE peut provoquer un incendie ou une explosion.

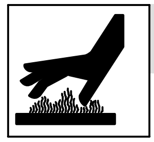
Le soudage effectué sur des conteneurs fermés tels que des réservoirs, tambours ou des conduites peut provoquer leur éclatement. Des étincelles peuvent être projetées de l'arc de soudure. La projection d'étincelles, des pièces chaudes et des équipements chauds peut provoquer des incendies et des brûlures. Le contact accidentel de l'électrode avec des objets métalliques peut provoquer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s'assurer que l'endroit ne présente pas de danger.

- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologués.
- Ne pas souder dans un endroit là où des étincelles peuvent tomber sur des substances inflammables.
- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Brancher le câble sur la pièce le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution et d'incendie.
- Brancher le câble de masse sur la pièce le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution, d'étincelles et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.
- Suivre les recommandations dans OSHA 1910.252(a)(2)(iv) et NFPA 51B pour les travaux à chaud et avoir de la surveillance et un extincteur à proximité.



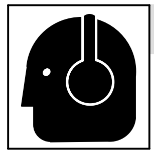
DES PARTICULES VOLANTES peuvent blesser les yeux.

- Le soudage, l'écaillement, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.



DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

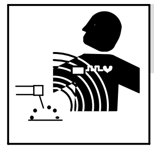
- Ne pas toucher à mains nues les parties chaudes.
- Prévoir une période de refroidissement avant de travailler à l'équipement.
- Ne pas toucher aux pièces chaudes, utiliser les outils recommandés et porter des gants de soudage et des vêtements épais pour éviter les brûlures.



LE BRUIT peut affecter l'ouïe.

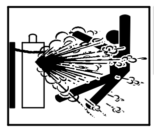
Le bruit des processus et des équipements peut affecter l'ouïe.

- Porter des protections approuvés pour les oreilles si le niveau sonore est trop élevé.



LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.

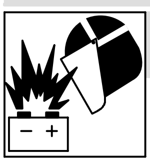


Si des BOUTEILLES sont endommagées, elles pourront exploser.

Des bouteilles de gaz protecteur contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, des dommages physiques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée − risque d'explosion.
- Utiliser seulement des bouteilles de gaz protecteur, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Ne pas tenir la tête en face de la sortie en ouvrant la soupape de la bouteille.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d'utilisation ou de branchement de la bouteille.
- Utiliser les équipements corrects, les bonnes procédures et suffisamment de personnes pour soulever et déplacer les bouteilles.
- Lire et suivre les instructions sur les bouteilles de gaz comprimé, l'équipement connexe et le dépliant P-1 de la CGA (Compressed Gas Association) mentionné dans les principales normes de sécurité.

2-3. Dangers existant en relation avec le moteur



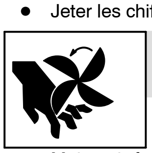
L'EXPLOSION DE LA BATTERIE peut RENDRE AVEUGLE.

- Toujours porter une protection faciale, des gants en caoutchouc et vêtements de protection lors d'une intervention sur la batterie.
- Arrêter le moteur avant de débrancher ou de brancher les câbles de batterie.
- Eviter de provoquer des étincelles avec les outils en travaillant sur la batterie.
- Ne pas utiliser le poste de soudage pour charger les batteries ou des véhicules de démarrage rapide.
- Observer la polarité correcte (+ et −) sur les batteries.
- Débrancher le câble négatif (–) en premier lieu. Le rebrancher en dernier lieu.



LE CARBURANT MOTEUR peut provoquer un incendie ou une explosion.

- Arrêter le moteur avant de vérifier le niveau de carburant ou de faire le plein.
- Ne pas faire le plein en fumant ou proche d'une source d'étincelles ou d'une flamme nue.
- Ne pas faire le plein de carburant à ras bord; prévoir de l'espace pour son expansion.
- Faire attention de ne pas renverser de carburant. Nettoyer tout carburant renversé avant de faire démarrer le moteur.
- Jeter les chiffons dans un récipient ignifuge.



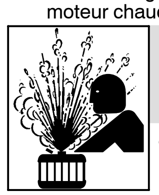
DES ORGANES MOBILES peuvent provoquer des blessures.

- Ne pas approcher les mains des ventilateurs, courroies et autres pièces en mouvement.
- Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.
- Arrêter le moteur avant d'installer ou brancher l'appareil.
- Seules des personnes qualifiées sont autorisées à enlever les portes, panneaux, recouvrements ou dispositifs de protection pour effectuer, s'il y a lieu, des travaux d'entretien et de dépannage.
- Pour empêcher tout démarrage accidentel pendant les travaux d'entretien, débrancher le câble négatif (–) de batterie de la borne.
- Ne pas approcher les mains, cheveux, vêtements lâches et outils des organes mobiles.
- Remettre en place les panneaux ou les dispositifs de protection et fermer les portes à la fin des travaux d'entretien et avant de faire démarrer le moteur.
- Avant d'intervenir, déposer les bougies ou injecteurs pour éviter la mise en route accidentelle du moteur.
- Bloquer le volant moteur pour éviter sa rotation lors d'une intervention sur le générateur.



DES PIECES CHAUDES peuvent provoquer des brûlures et blessures.

- Ne pas toucher les parties chaudes du moteur.
- Laisser l'ensemble se refroidir avant d'effectuer la maintenance.
- Porter des gants et des vêtements de protection pour travailler sur un moteur chaud.



LA VAPEUR ET LE LIQUIDE DE REFROIDISSEMENT CHAUD peuvent provoquer des brûlures.

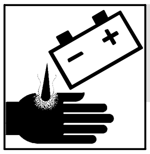
- Il est préférable de vérifier le liquide de refroidissement une fois le moteur refroidi pour éviter de se brûler.
- Toujours vérifier le niveau de liquide de refroidissement dans le vase d'expansion (si présent), et non dans le radiateur (sauf si précisé autrement dans la section maintenance du manuel du moteur).

- Si le moteur est chaud et que le liquide doit être vérifié, opérer comme suivant.
- Mettre des lunettes de sécurité et des gants, placer un torchon sur le bouchon du radiateur.
- Dévisser le bouchon légèrement et laisser la vapeur s'échapper avant d'enlever le bouchon.



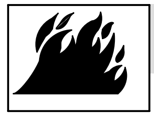
LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.



L'ACIDE DE LA BATTERIE peut provoquer des brûlures dans les YEUX et sur la PEAU.

- Ne pas renverser la batterie.
- Remplacer une batterie endommagée.
- Rincer immédiatement les yeux et la peau à l'eau.



- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces inflammables.
- Tenir à distance les produits inflammables de l'échappement.



LES ÉTINCELLES À L'ÉCHAPPEMENT peuvent provoquer un incendie.

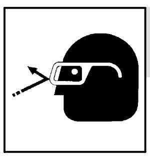
- Empêcher les étincelles d'échappement du moteur de provoquer un incendie.
- Utiliser uniquement un pare-étincelles approuvé − voir codes en vigueur.

2-4. Dangers liés à l'air comprimé



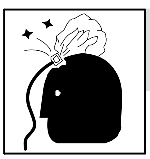
RESPIRER L'AIR COMPRIMÉ peut provoquer des blessures graves ou causer la mort.

- Ne pas utiliser l'air comprimé pour respirer.
- Utiliser l'air comprimé seulement pour le coupage, gougeage et les outils pneumatiques.



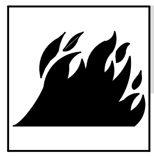
L'AIR COMPRIMÉ peut provoquer des blessures.

- Porter des lunettes de sécurité approuvées.
- Ne pas diriger le jet d'air vers d'autres ou soi-même.



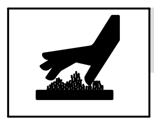
L'AIR COMPRIME EMMAGASINE ET DES TUYAUX SOUS PRESSION peuvent provoquer des blessures.

- Relâcher la pression d'air de l'outillage ou du système avant d'effectuer la maintenance, avant de changer ou de rajouter des éléments ou avant d'ouvrir la purge ou le bouchon de remplissage d'huile.



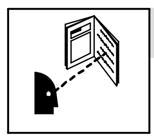
Le METAL CHAUD lors du coupage et gougeage plasma peut provoquer un incendie ou une explosion.

- Ne pas couper ou gouger à proximité de produits inflammables.
- Surveillez et garder un extincteur à proximité.



DES PIECES CHAUDES peuvent provoquer des brûlures et blessures.

- Ne pas toucher le compresseur ou d'autres éléments du circuit air comprimé chauds.
- Laisser l'ensemble se refroidir avant de toucher ou d'effectuer la maintenance.



LIRE LES INSTRUCTIONS.

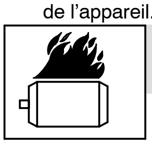
- Lisez le manuel d'instructions avant l'utilisation ou la maintenance de l'appareil.
- Arrêter le moteur et relâcher la pression avant d'effectuer la maintenance.
- Utiliser uniquement des pièces de rechange Miller/Hobart.

2-5. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance



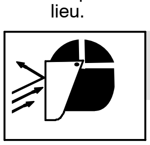
LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser un œilleton de levage pour lever l'appareil et les accessoires correctement installés. Ne pas dépasser le poids nominal maximal de l'œilleton (voir les spécifications).
- Ne lever et ne soutenir l'appareil qu'avec de l'équipement approprié et en suivant les procédures adéquates.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.



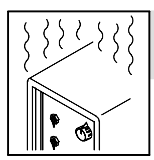
LE SURCHAUFFEMENT peut endommager le moteur électrique.

- Arrêter ou déconnecter l'équipement avant de démarrer ou d'arrêter le moteur.
- Ne pas laisser tourner le moteur trop lentement sous risque d'endommager le moteur électrique à cause d'une tension et d'une fréquence trop faibles.
- Ne pas brancher de moteur de 50 ou de 60 Hz à la prise de 100 Hz, s'il y a lieu.



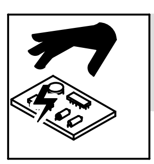
LES ÉTINCELLES VOLANTES risquent de provoquer des blessures.

- Porter un écran facial pour protéger le visage et les yeux.
- Affûter l'électrode au tungstène uniquement à la meuleuse dotée de protecteurs. Cette manœuvre est à exécuter dans un endroit sûr lorsque l'on porte l'équipement homologué de protection du visage, des mains et du corps.
- Les étincelles risquent de causer un incendie − éloigner toute substance inflammable.



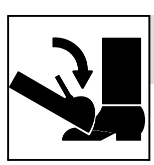
L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Laisser l'équipement refroidir ; respecter le facteur de marche nominal.
- Réduire le courant ou le facteur de marche avant de poursuivre le soudage.
- Ne pas obstruer les passages d'air du poste.



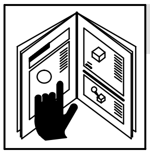
LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes de circuits imprimes.



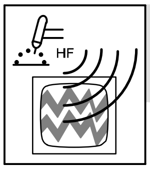
UNE REMORQUE QUI BASCULE peut entraîner des blessures.

- Utiliser les supports de la remorque ou des blocs pour soutenir le poids.
- Installer convenablement le poste sur la remorque comme indiqué dans le manuel s'y rapportant.



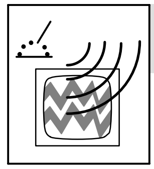
LIRE LES INSTRUCTIONS.

- Utiliser seulement les pièces de rechange d'origine.
- Effectuer la maintenance du moteur et du compresseur (si applicable) suivant ce manuel et le manuel du moteur/compresseur (si applicable).



LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le rayonnement haute fréquence (H.F.) peut provoquer des interférences avec les équipements de radio−navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et un blindage pour réduire les interférences éventuelles.



LE SOUDAGE À L'ARC risque de provoquer des interférences.

- L'énergie électromagnétique risque de provoquer des interférences pour l'équipement électronique sensible tel que les ordinateurs et l'équipement commandé par ordinateur tel que les robots.
- Veiller à ce que tout l'équipement de la zone de soudage soit compatible électromagnétiquement.
- Pour réduire la possibilité d'interférence, maintenir les câbles de soudage aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à souder à une distance de 100 mètres de tout équipement électronique sensible.
- Veiller à ce que ce poste de soudage soit posé et mis à la terre conformément à ce mode d'emploi.
- En cas d'interférences après avoir pris les mesures précédentes, il incombe à l'utilisateur de prendre des mesures supplémentaires telles que le déplacement du poste, l'utilisation de câbles blindés, l'utilisation de filtres de ligne ou la pose de protecteurs dans la zone de travail.

2-6. Proposition californienne 65 Avertissements

▲ **Les équipements de soudage et de coupage produisent des fumées et des gaz qui contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des malformations congénitales et, dans certains cas, des cancers. (Code de santé et de sécurité de Californie, chapitre 25249.5 et suivants)**

▲ **Les batteries, les bornes et autres accessoires contiennent du plomb et des composés à base de plomb, produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des cancers et des malformations congénitales ou autres problèmes de procréation. Se laver les mains après manipulation.**

Pour les moteurs à essence :

▲ **Les gaz d'échappement des moteurs contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des cancers et des malformations congénitales ou autres problèmes de procréation.**

Pour les moteurs diesel :

▲ **Les gaz d'échappement des moteurs diesel et certains de leurs composants sont reconnus par l'État de Californie comme provoquant des cancers et des malformations congénitales ou autres problèmes de procréation.**

2-7. Principales normes de sécurité

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping, American Welding Society Standard AWS F4.1 de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

National Electrical Code, NFPA Standard 70, de National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (téléphone : 617-770-3000, site Internet : www.nfpa.org).

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, de Compressed Gas Association, 1735 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102 (téléphone : 703-412-0900, site Internet : www.cganet.com).

Code for Safety in Welding and Cutting, CSA Standard W117.2, de Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3 (téléphone : 800-463-6727 ou à Toronto 416-747-4044, site Internet : www.csa-international.org).

Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, de American National Standards Institute, 11 West 42nd Street, New York, NY 10036-8002 (téléphone : 212-642-4900, site Internet : www.ansi.org).

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, de National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (téléphone : 617-770-3000, site Internet : www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, de U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (il y a 10 bureaux régionaux−−le téléphone de la région 5, Chicago, est 312-353-2220, site Internet : www.osha.gov).

2-8. Information EMF

Considérations sur le soudage et les effets de basse fréquence et des champs magnétiques et électriques.

Le courant de soudage, pendant son passage dans les câbles de soudage, causera des champs électromagnétiques. Il y a eu et il y a encore un certain souci à propos de tels champs. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité spécial ruban bleu du National Research Council a conclu : « L'accumulation de preuves, suivant le jugement du comité, n'a pas démontré que l'exposition aux champs magnétiques et champs électriques à haute fréquence représente un risque à la santé humaine ». Toutefois, des études sont toujours en cours et les preuves continuent à être examinées. En attendant que les conclusions finales de la recherche soient établies, il vous serait souhaitable de réduire votre exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Pour réduire les champs magnétiques sur le poste de travail, appliquer les procédures suivantes :

1. Maintenir les câbles ensemble en les tordant ou en les enveloppant.
2. Disposer les câbles d'un côté et à distance de l'opérateur.
3. Ne pas courber pas et ne pas entourer pas les câbles autour de votre corps.
4. Garder le poste de soudage et les câbles le plus loin possible de vous.
5. Connecter la pince sur la pièce aussi près que possible de la soudure.

En ce qui concerne les stimulateurs cardiaques

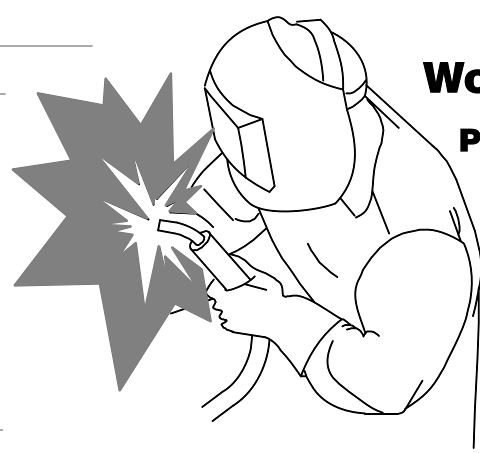
Les porteurs de stimulateur cardiaque doivent consulter leur médecin avant de souder ou d'approcher des opérations de soudage. Si le médecin approuve, il est recommandé de suivre les procédures précédentes.

SECTION 3 – DEFINITIONS

3-1. Symbol Definitions

	Stop Engine		Fast (Run, Weld/Power)		Fast/Slow (Run/Idle)		Slow (Idle)
	Start Engine		Panel/Local		Temperature		Fuel
	Engine Oil		Engine Choke		Check Valve Clearance		Battery (Engine)
	Engine		Read Operator's Manual	A	Amperes	V	Volts
	MIG (GMAW), Wire		Stick (SMAW)		TIG (GTAW)		Lift Arc TIG
+	Positive	—	Negative		Alternating Current (AC)		Output
	Time	h	Hours	s	Seconds		Protective Earth (Ground)
	Do not switch while welding		Remote Receptacle		Work Connection	CC	Constant Current
	Wire Feed		Electrode Positive		Electrode Negative	CV	Constant Voltage
	Circuit Protector						

Notes



Work like a Pro!

Pros weld and cut safely. Read the safety rules at the beginning of this manual.

SECTION 4 – SPECIFICATIONS

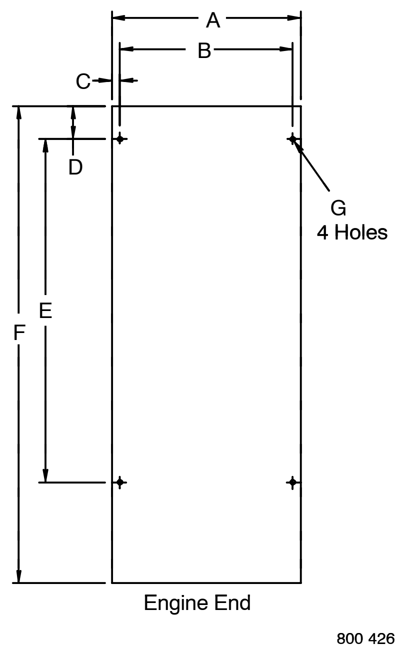
4-1. Weld, Power, And Engine Specifications

Welding Mode	Rated Welding Output	Maximum Open-Circuit Voltage	Weld Output Range	Generator Power Rating	Fuel Capacity	Engine
CC/DC	280 A, 25 V, 100% Duty Cycle	50	20 – 300 A	Continuous: 9.5 kVA/ kW, 80/40 A, 120/240 V AC, 60 Hz, Single-Phase, Peak: 10.5 kVA/kW (w/Weld Contactor Off)	12 gal (45 L) Tank	Robin EH65 Air-Cooled, Two-Cylinder, Four-Cycle, 22 HP Gasoline Engine or Kohler CH-23 Air-Cooled, Two-Cylinder, Four-Cycle, 23 HP Gasoline Engine
CV/DC	300 A, 25 V, 100% Duty Cycle	35	13 – 35 V			
CC/AC*	200 A, 25 V, 60% Duty Cycle	60	35 – 225 A			

* AC/DC Models Only.

4-2. Dimensions, Weights, and Operating Angles

Dimensions	
Height	33–1/2 in (851 mm) (To Top Of Exhaust)
Width	20 in (508 mm)
Depth	45-3/8 in (1153 mm)
A	20 in (508 mm)
B	16-1/2 in (419 mm)
C	1-3/4 in (44 mm)
D	6–1/16 in (154 mm)
E	32-3/4 in (832 mm)
F	45–3/8 in (1153 mm)
G	13/32 in (10 mm) Dia.
Weight	
Robin: 580 lb (263 kg) Kohler: 580 lb (263 kg)	
Lifting Eye Weight Rating	
1280 lb (580 kg)	

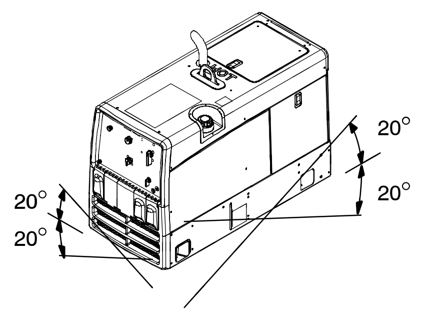


800 426



▲ **Do not exceed tilt angles or engine could be damaged or unit could tip.**

▲ **Do not move or operate unit where it could tip.**

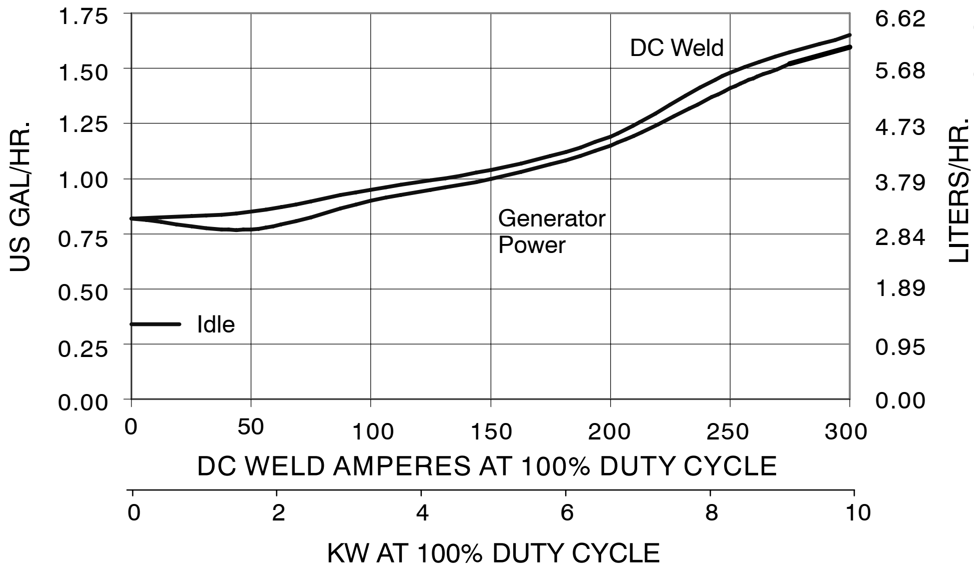


803 572–A

4-3. Fuel Consumption Curves

On a typical job using 1/8 in 7018 electrodes (125 amps, 20% duty cycle), expect about 20 hours of operation.

Welding at 150 amps at 40% duty cycle uses approximately 3/4 gallon per hour, or about 16 hours of operation.

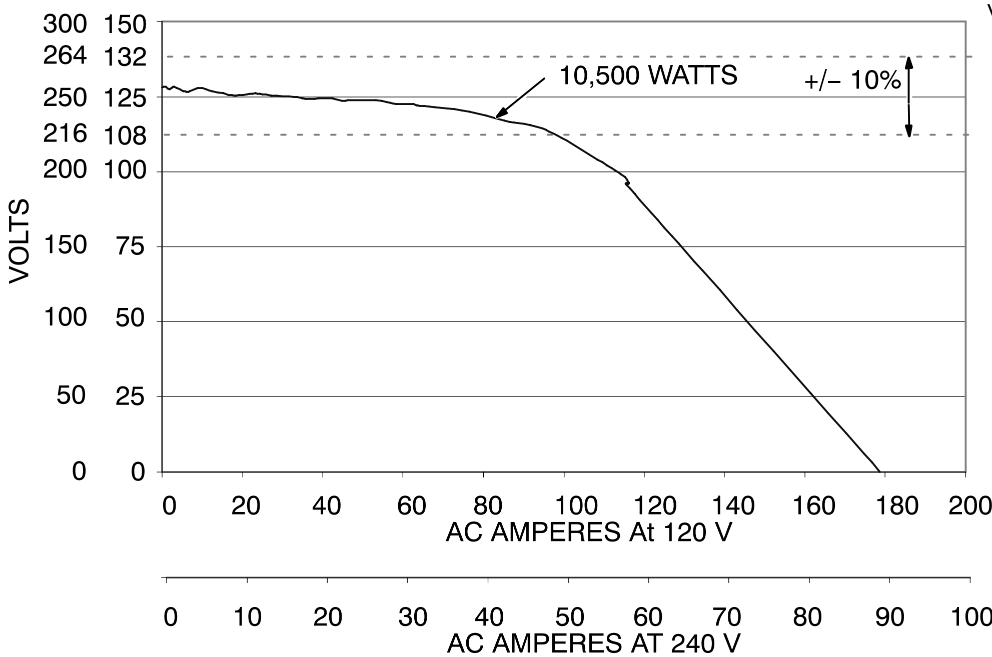


206 135 / 206 136

4-4. Generator Power Curve

The ac generator power curve shows the generator power available in amperes at the receptacles.

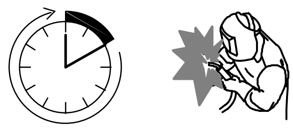
Tools and motors are designed to operate within 10% of 120/240 VAC.



Ref. 220 807−A

4-5. Duty Cycle

100% Duty Cycle at 280 Amperes DC

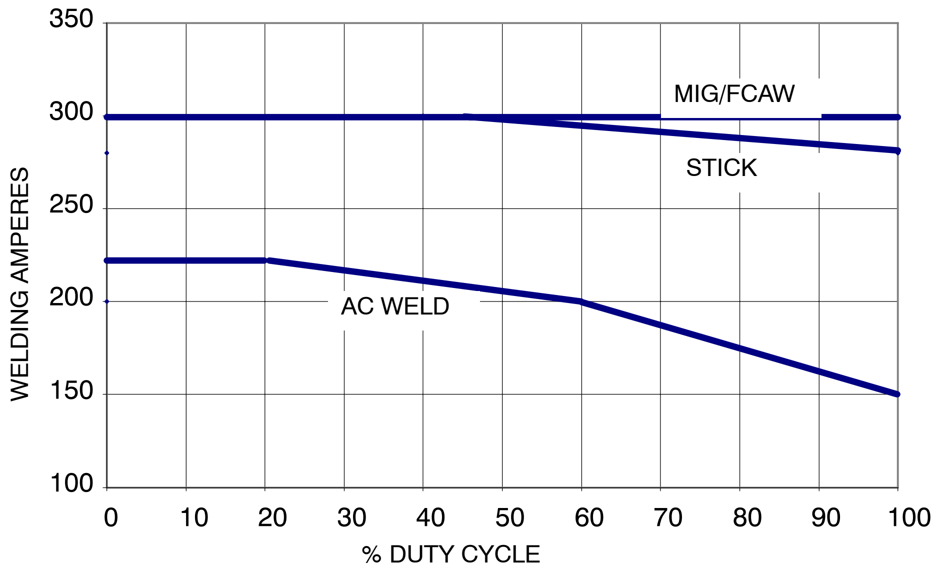


Continuous Welding

Duty cycle is the percentage of 10 minutes that unit can weld at rated load without overheating.

▲ **Exceeding duty cycle can damage unit and void warranty.**

☞ *AC output is not available on all models.*

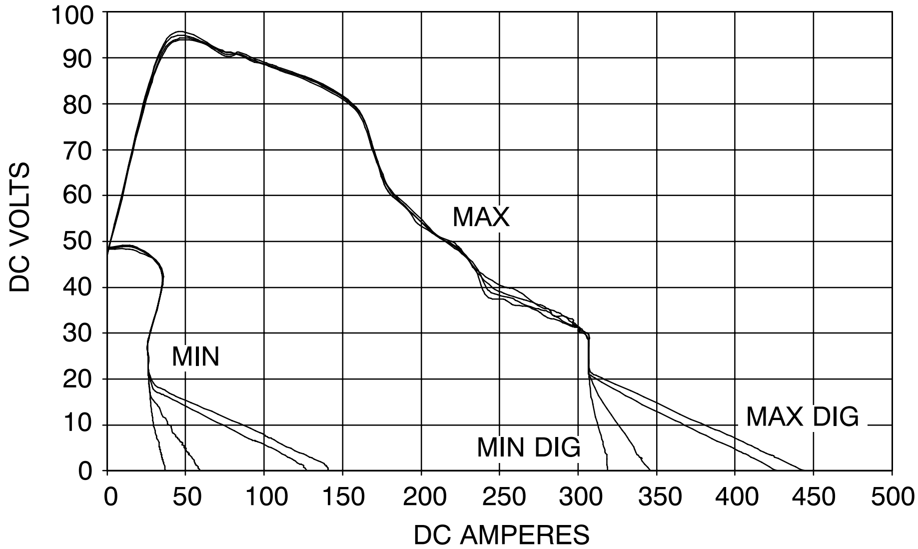


Notes

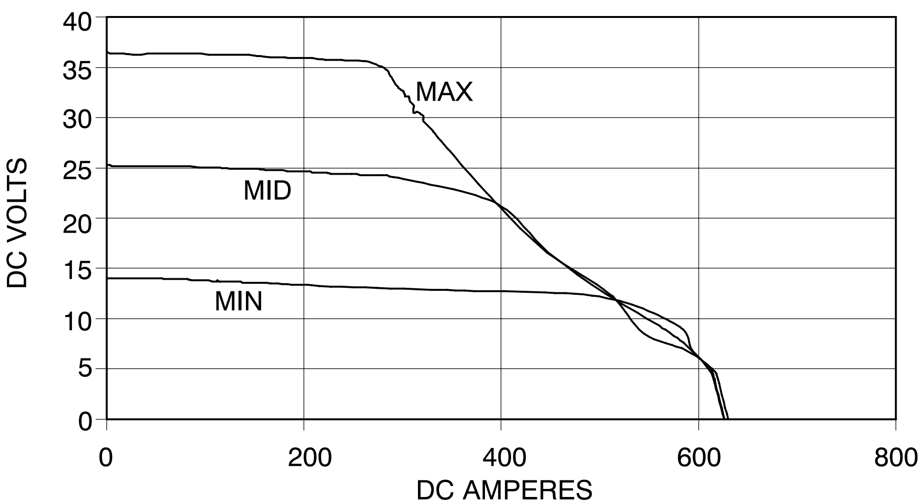
4-6. Stick And MIG Mode Volt-Ampere Curves

The volt-ampere curves show the minimum and maximum voltage and amperage output capabilities of the welding generator. Curves of other settings fall between the curves shown.

A. CC/DC Stick Mode

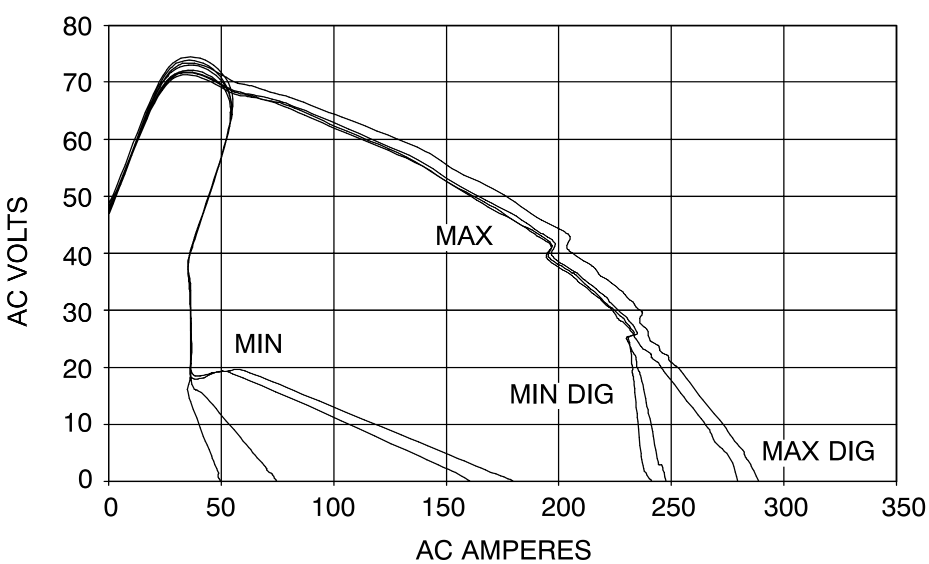


B. CV/DC MIG Mode



C. CC/AC STICK Mode

☞ *AC output is not available on all models.*



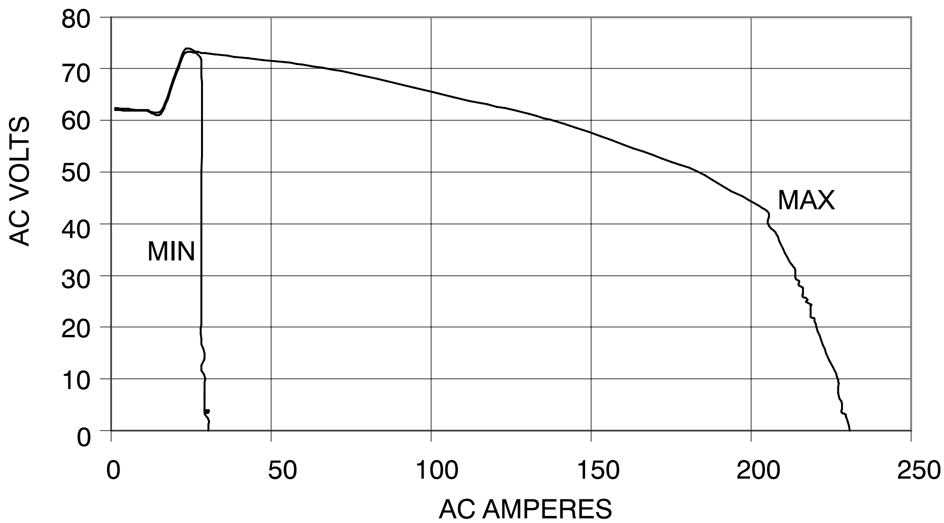
228 632 / 220 313–A / 228 631

4-7. TIG Mode Volt-Ampere Curves

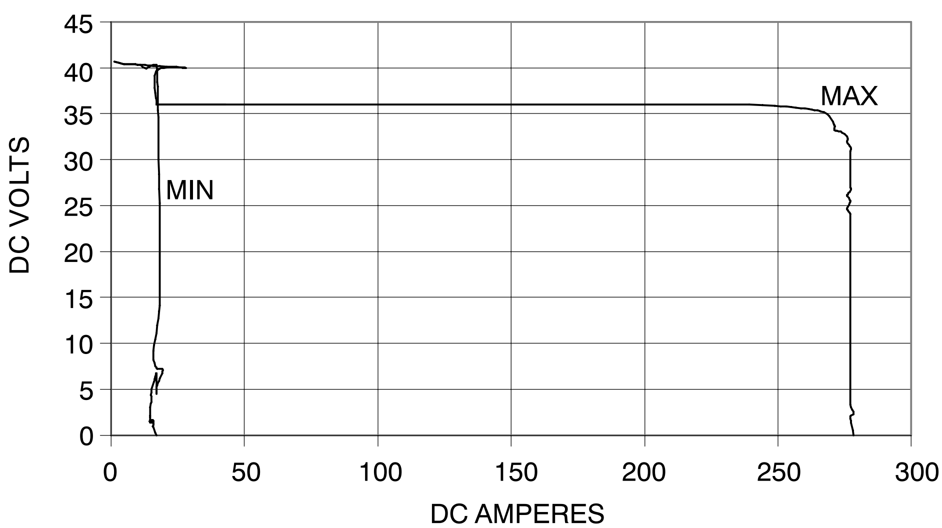
The volt-ampere curves show the minimum and maximum voltage and amperage output capabilities of the welding generator. Curves of other settings fall between the curves shown.

☞ *AC output is not available on all models.*

A. CC/AC TIG Mode



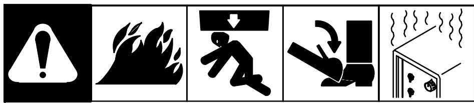
B. CC/DC TIG Mode



220 312–A / 220 311–A

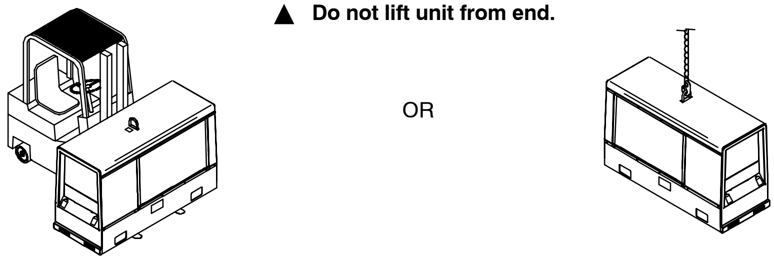
SECTION 5 – INSTALLATION

5-1. Installing Welding Generator

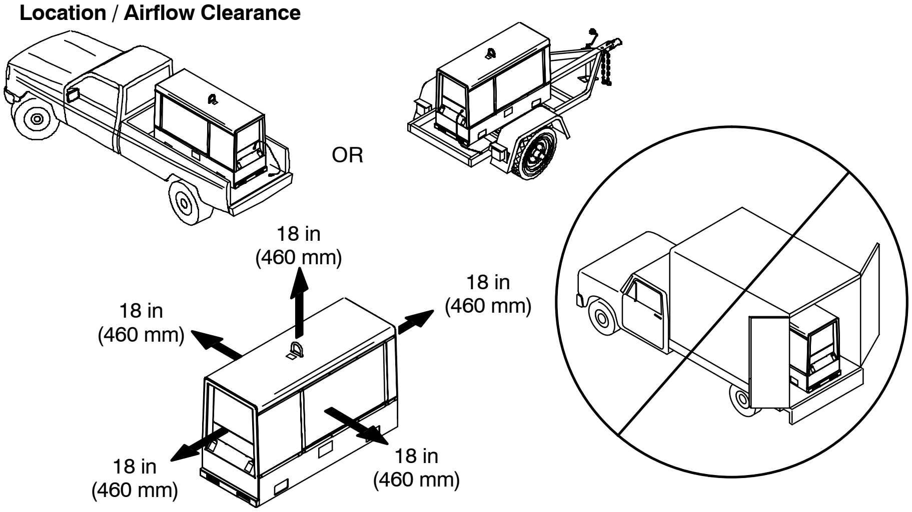


Movement

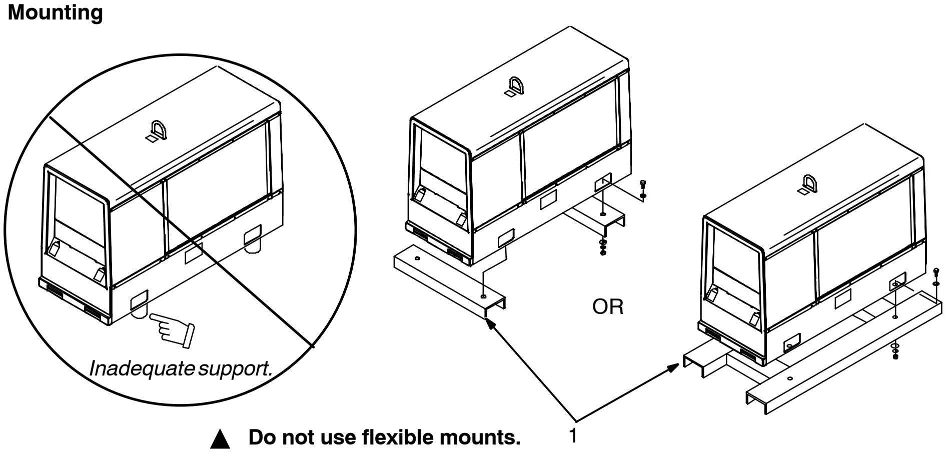
▲ **Do not lift unit from end.**



Location / Airflow Clearance

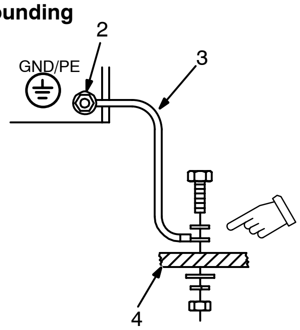


Mounting



▲ **Do not use flexible mounts.**

Grounding



▲ **Bed liners, shipping skids, and some running gears insulate the welding generator from the vehicle frame. Always connect a ground wire from the generator equipment grounding terminal to bare metal on the vehicle frame as shown.**

Electrically bond generator frame to vehicle frame by metal-to-metal contact.

install2 12/06 – Ref. 800 652 / Ref. 800 477-A / 803 274-A / 804 712

▲ **Do not weld on base. Welding on base can cause fuel tank fire or explosion. Bolt unit down using holes provided in base.**

▲ **Always securely fasten welding generator onto transport vehicle or trailer and comply with all DOT and other applicable codes.**

▲ **Do not mount unit by supporting the base only at the four mounting holes. Use cross-supports to adequately support unit and prevent damage to base.**

▲ **Always ground generator frame to vehicle frame to prevent electric shock and static electricity hazards.**

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

▲ **Do not install unit where air flow is restricted or engine may overheat.**

Mounting:

1 Cross-Supports

Mount unit on flat surface or use cross-supports to support base.

Grounding:

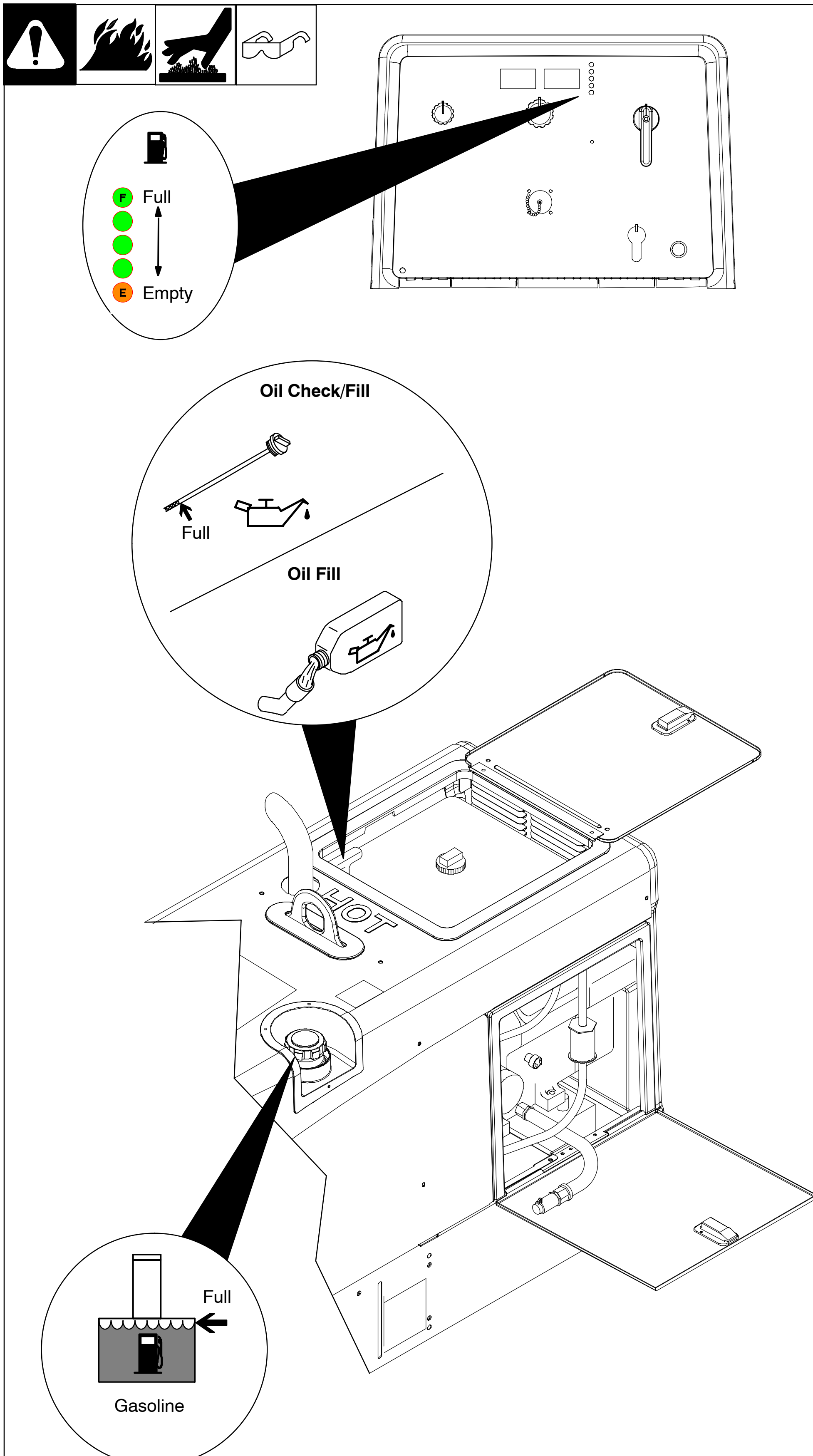
2 Equipment Grounding Terminal (On Front Panel)

3 Grounding Cable (Not Supplied)

4 Metal Vehicle Frame

Connect cable from equipment ground terminal to metal vehicle frame. Use #10 AWG or larger insulated copper wire.

5-2. Engine Prestart Checks (Kohler-Powered Units)



Check all fluids daily. Engine must be cold and on a level surface. Unit is shipped with 10W30 engine oil.

☞ *Follow run-in procedure in engine manual.*

☞ *This unit has a low oil pressure shutdown switch. However, some conditions may cause engine damage before the engine shuts down. Check oil level often and do not use the oil pressure shutdown system to monitor oil level.*

Open top service door

Fuel

Add fresh fuel before starting engine the first time (see maintenance label for specifications). Always leave filler neck empty to allow room for expansion. Check fuel level on a cold engine before use each day.

To check fuel level, turn Engine Control switch to Run/Idle position. LED's indicate fuel level in tank.

Oil

☞ *Do not exceed the "Full" mark on the oil level dipstick. The fuel pump may operate erratically if crankcase is overfilled.*

After fueling, check oil with unit on level surface. If oil is not up to full mark on dipstick, add oil (see maintenance label).

Use front panel meters to determine hours until next recommended oil change (see Section 6-1).

☞ *To improve cold weather starting:*

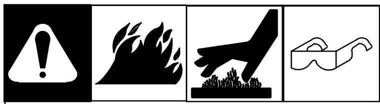
Keep battery in good condition. Store battery in warm area.

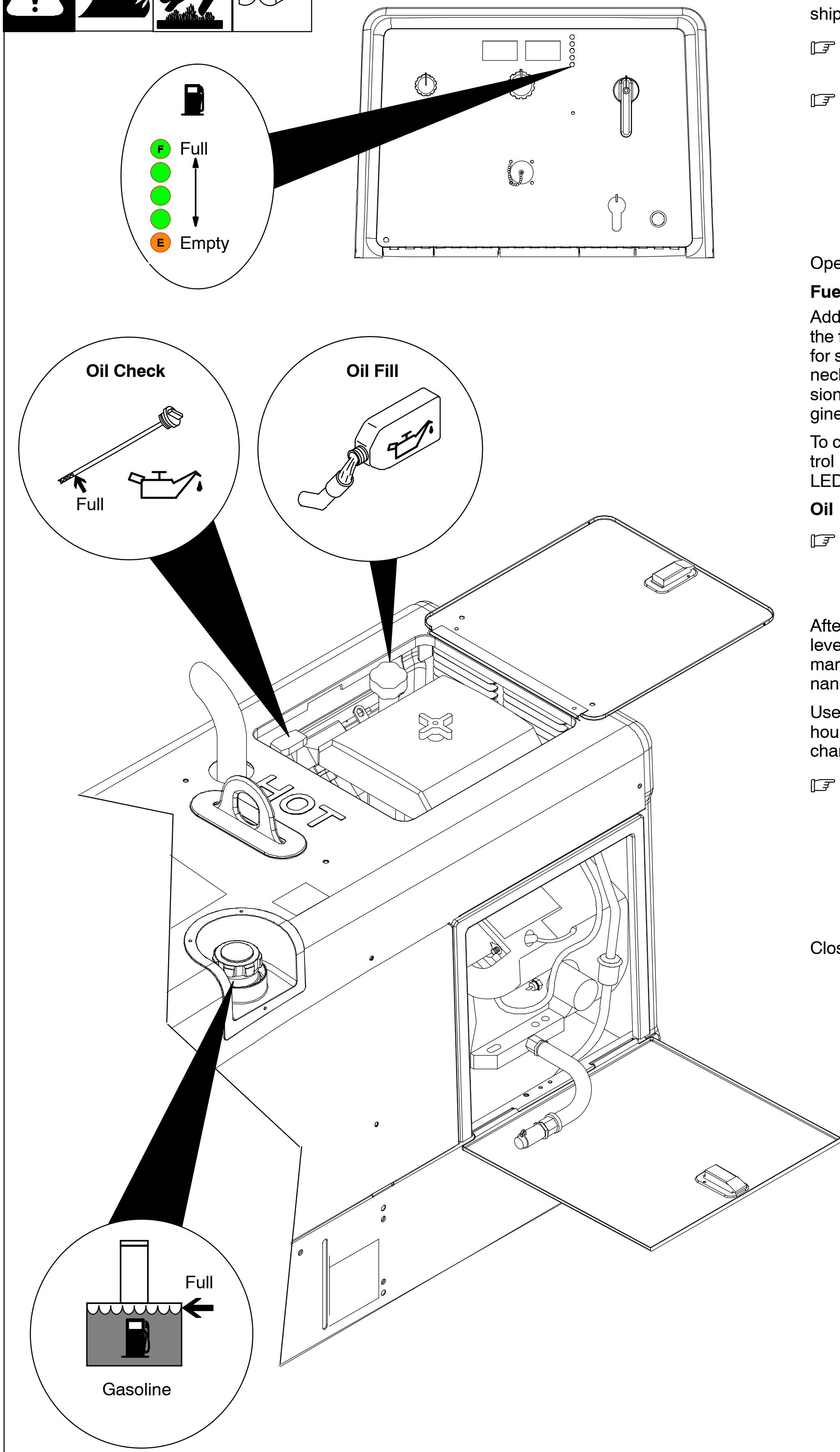
Use correct grade oil for cold weather.

Close top service door

Ref. 803 571–A / Ref. 803 573–A

5-3. Engine Prestart Checks (Robin-Powered Units)





Check all fluids daily. Engine must be cold and on a level surface. Unit is shipped with 10W30 engine oil.

☞ *Follow run-in procedure in engine manual.*

☞ *This unit has a low oil pressure shutdown switch. However, some conditions may cause engine damage before the engine shuts down. Check oil level often and do not use the oil pressure shutdown system to monitor oil level.*

Open top service door.

Fuel

Add fresh fuel before starting engine the first time (see maintenance label for specifications). Always leave filler neck empty to allow room for expansion. Check fuel level on a cold engine before use each day.

To check fuel level, turn Engine Control switch to Run/Idle position. LED's indicate fuel level in tank.

Oil

☞ *Do not exceed the "Full" mark on the oil level dipstick. The fuel pump may operate erratically if crankcase is overfilled.*

After fueling, check oil with unit on level surface. If oil is not up to full mark on dipstick, add oil (see maintenance label).

Use front panel meters to determine hours until next recommended oil change (see Section 6-1).

☞ *To improve cold weather starting:*

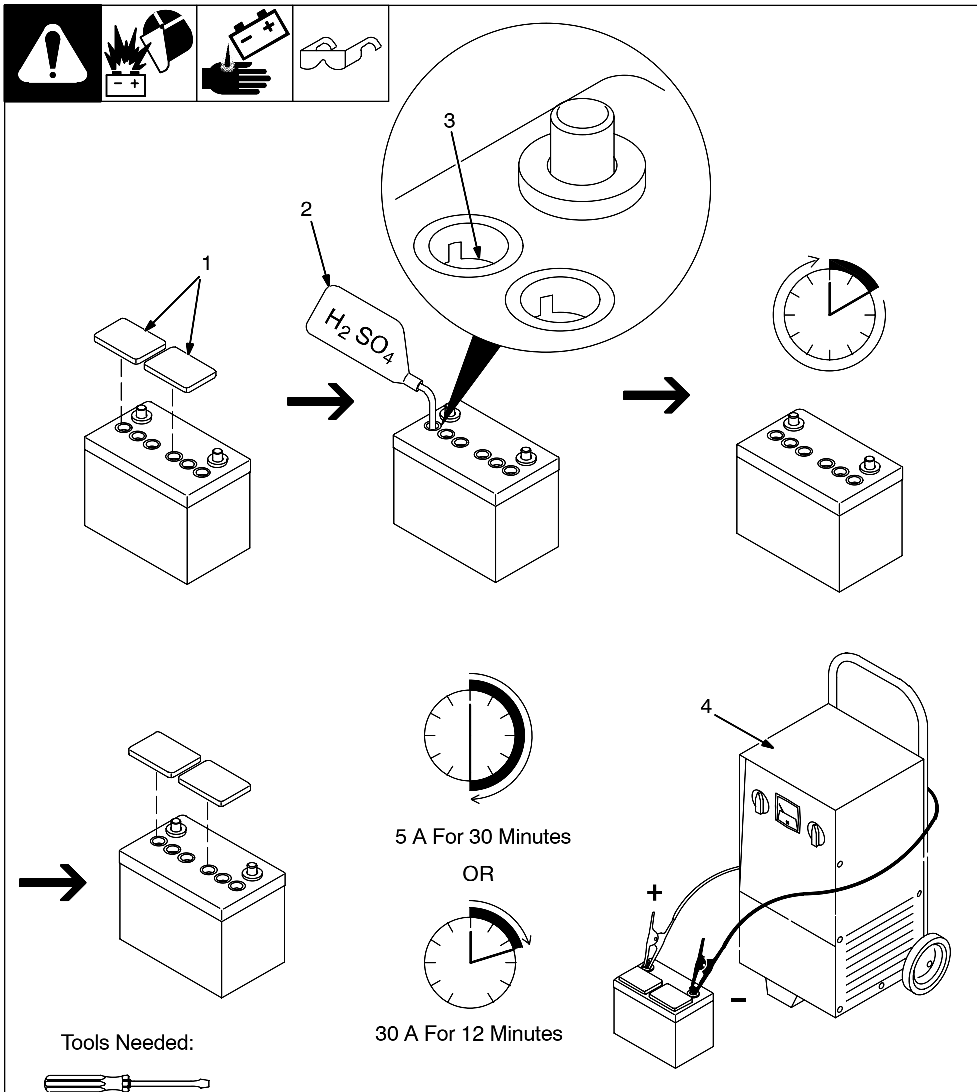
Keep battery in good condition. Store battery in warm area.

Use correct grade oil for cold weather.

Close top service door.

Ref. 803 571–A / Ref. 803 572–A

5-4. Activating The Dry Charge Battery (If Applicable)



▲ **Always wear a face shield, rubber gloves and protective clothing when working on a battery.**

Remove battery from unit.

1 Vent Caps

2 Sulfuric Acid Electrolyte (1.265 Specific Gravity)

3 Well

Fill each cell with electrolyte to **bottom** of well (maximum).

▲ **Do not overfill battery cells.**

Wait ten minutes and check electrolyte level. If necessary, add electrolyte to raise to proper level. Reinstall vent caps.

4 Battery Charger

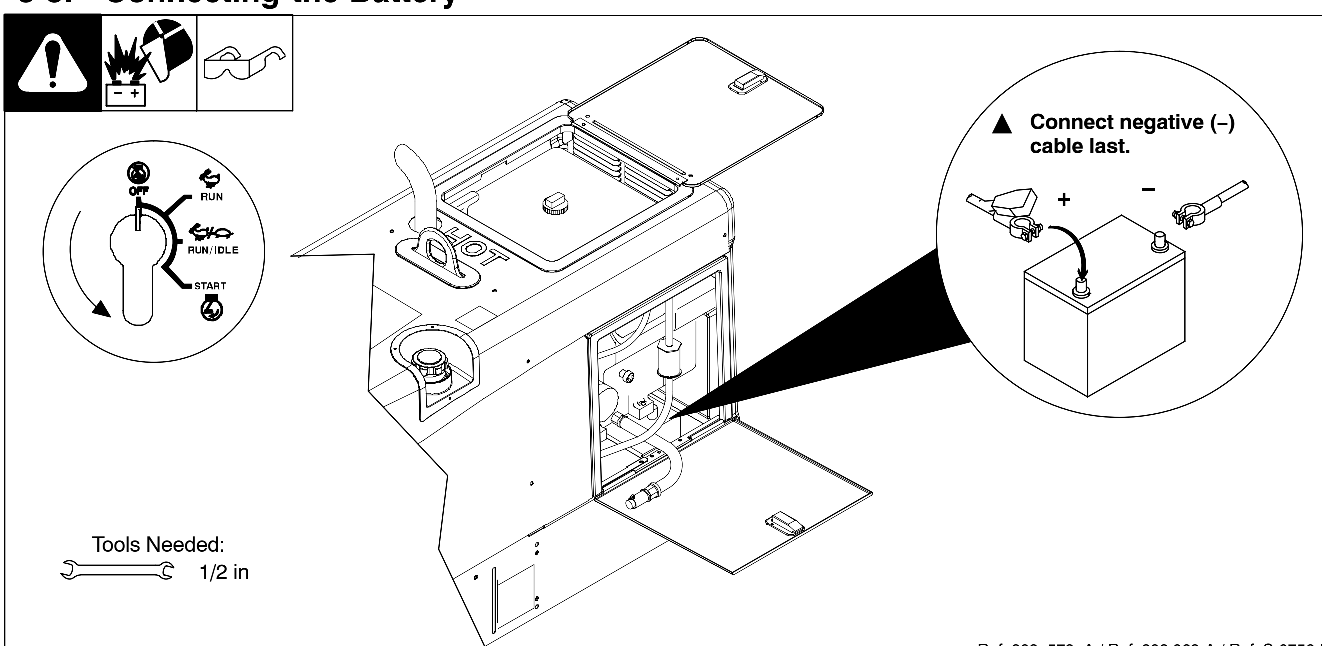
▲ **Read and follow all instructions supplied with battery charger.**

Charge battery for 12 minutes at 30 amperes or 30 minutes at 5 amperes. Disconnect charging cables and install battery.

☞ *When electrolyte is low, add only distilled water to cells to maintain proper level.*

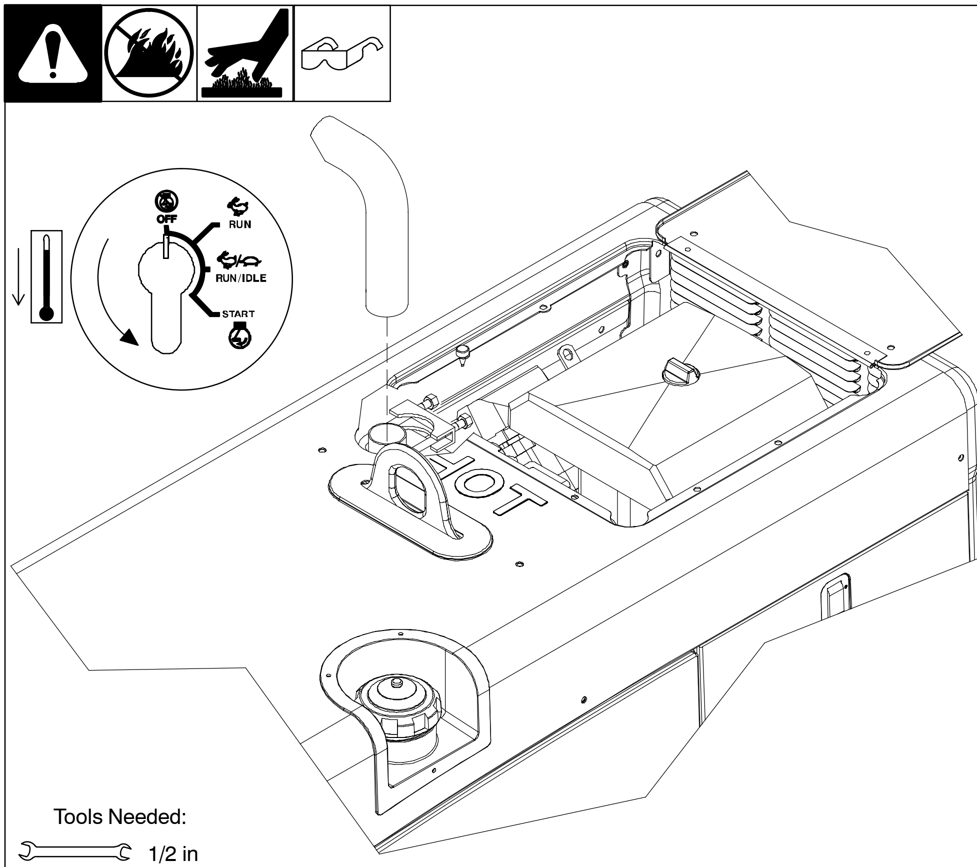
drybatt1 6/05 – S-0886

5-5. Connecting the Battery



Ref. 803-573-A / Ref. 202 069-A / Ref. S-0756-D

5-6. Installing Exhaust Pipe



- ▲ **Stop engine and let cool.**
- ▲ **Engine backfire can cause severe burns or other injuries. Do not point exhaust pipe toward control panel. Keep away from exhaust outlet.**
- ▲ **Do not point exhaust pipe toward LP fuel tank (if equipped). Do not point exhaust pipe towards shielding gas tank (if equipped).**

☞ *Point exhaust pipe in desired direction but always away from front panel and direction of travel.*

803 891/ Ref. 216 170

Notes

MATERIAL THICKNESS REFERENCE CHART

24 Gauge (.025 in)

22 Gauge (.031 in)

20 Gauge (.037 in)

18 Gauge (.050 in)

16 Gauge (.063 in)

14 Gauge (.078 in)

1/8 in (.125 in)

3/16 in (.188 in)

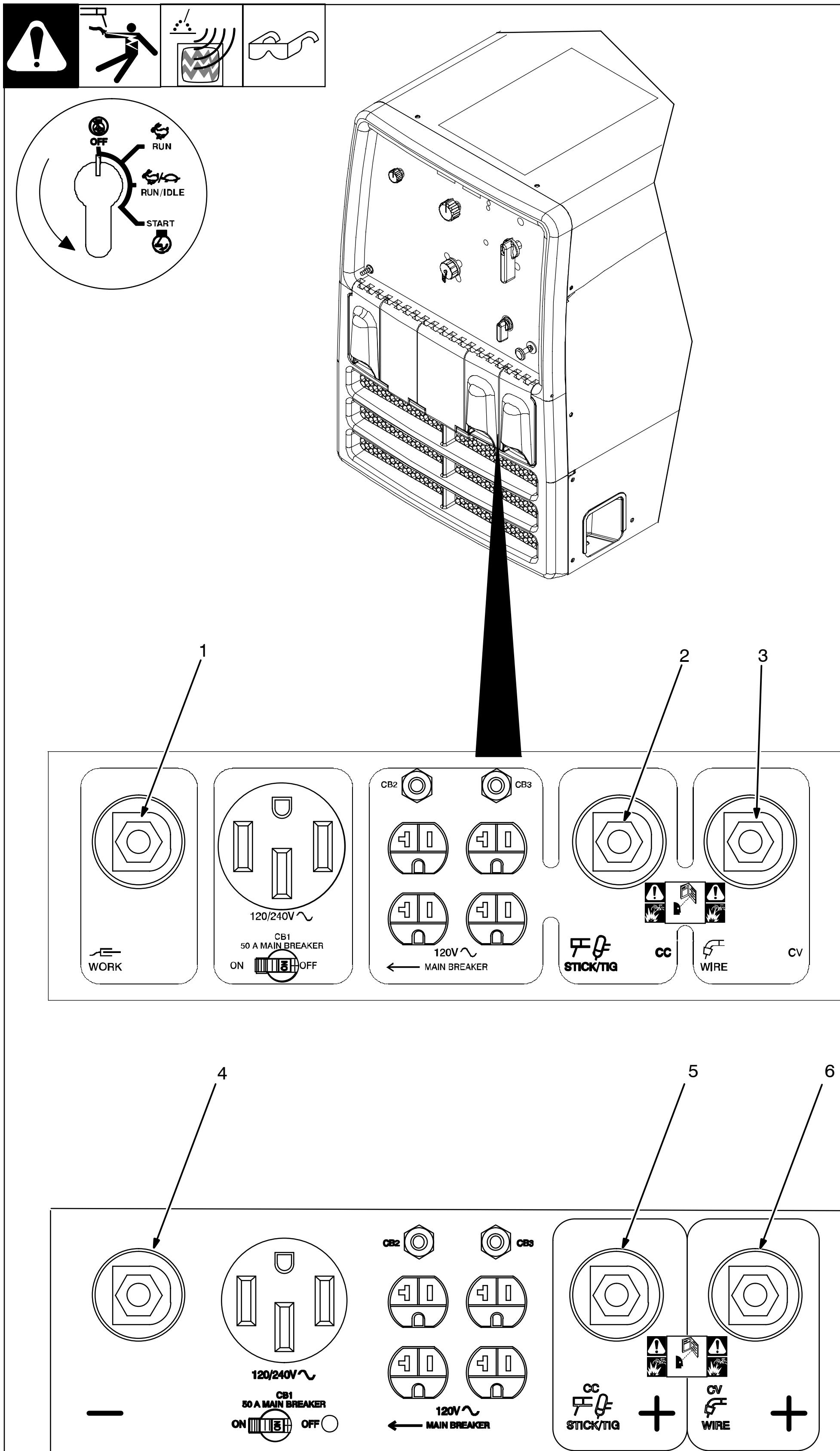
1/4 in (.25 in)

5/16 in (.313 in)

3/8 in (.375 in)

1/2 in (.5 in)

5-7. Weld Output Terminals



▲ **Stop engine.**

▲ **Do not connect to CC and CV terminals at the same time.**

AC/DC Models:

1 Work Weld Output Terminal

2 Stick/TIG (CC) Weld Output Terminal

3 Wire /CV Weld Output Terminal

For MIG welding, connect work cable to Work terminal and wire feeder cable to Wire (CV) terminal.

For Stick/TIG welding, connect work cable to Work terminal and electrode holder/TIG torch cable to Stick/TIG (CC) terminal.

DC Models:

4 Negative (−) Weld Output Terminal

5 Stick/TIG (+) Weld Output Terminal

6 Wire (+) Weld Output Terminal

For MIG welding, connect work cable to Negative (−) terminal and wire feeder cable to CV (Wire) terminal.

For Stick welding, connect work cable to Negative (−) terminal and electrode holder cable to CC (Stick/ TIG) terminal.

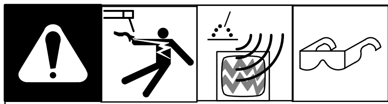
For TIG welding, connect work cable to CC (Stick/TIG) terminal and electrode holder cable to Negative (−) terminal.

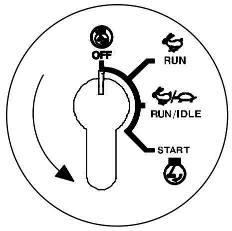
☞ *Weld output terminals on units with AC/DC output.*

☞ *Weld output terminals on units with DC output only.*

803 571 / Ref. 216 170 / 204 353 / Ref. 216 169-A

5-8. Connecting To Weld Output Terminals



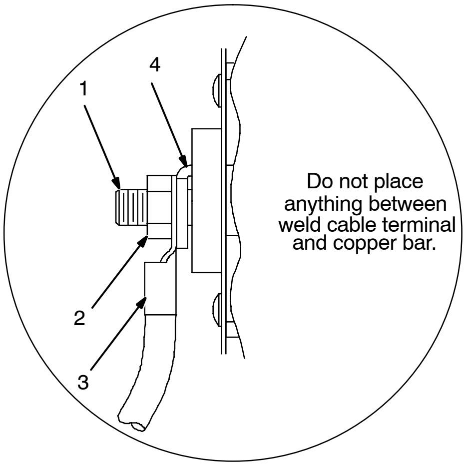


▲ **Stop engine.**

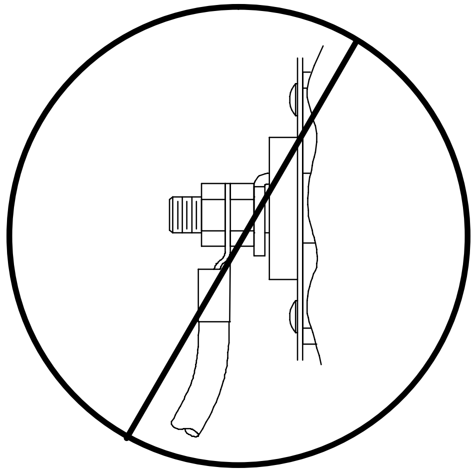
▲ **Failure to properly connect weld cables may cause excessive heat and start a fire, or damage your machine.**

1 Weld Output Terminal
2 Supplied Weld Output Terminal Nut
3 Weld Cable Terminal
4 Copper Bar

Remove supplied nut from weld output terminal. Slide weld cable terminal onto weld output terminal and secure with nut so that weld cable terminal is tight against copper bar. **Do not place anything between weld cable terminal and copper bar. Make sure that the surfaces of the weld cable terminal and copper bar are clean.**

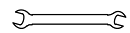


Correct Installation



Incorrect Installation

Tools Needed:


3/4 in

803 778-A

5-9. Selecting Weld Cable Sizes*



Weld Output Terminals ▲ **Stop engine before connecting to weld output terminals.** ▲ **Do not use worn, damaged, undersized, or poorly spliced cables.**	**Welding Amperes**	**Weld Cable Size** and Total Cable (Copper) Length in Weld Circuit Not Exceeding*****							
		100 ft (30 m) or Less		**150 ft (45 m)**	**200 ft (60 m)**	**250 ft (70 m)**	**300 ft (90 m)**	**350 ft (105 m)**	**400 ft (120 m)**
		10 – 60% Duty Cycle	**60 – 100% Duty Cycle**	**10 – 100% Duty Cycle**					
	100	4 (20)	4 (20)	4 (20)	3 (30)	2 (35)	1 (50)	1/0 (60)	1/0 (60)
	150	3 (30)	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	3/0 (95)
	200	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	4/0 (120)
	250	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 2/0 (2x70)
	300	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)
	350	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)
	400	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2 ea. 2/0 (2x70)	2 ea. 3/0 (2x95)	2 ea. 4/0 (2x120)	2 ea. 4/0 (2x120)

* This chart is a general guideline and may not suit all applications. If cables overheat, use next size larger cable.

**Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere.
( ) = mm^2 for metric use

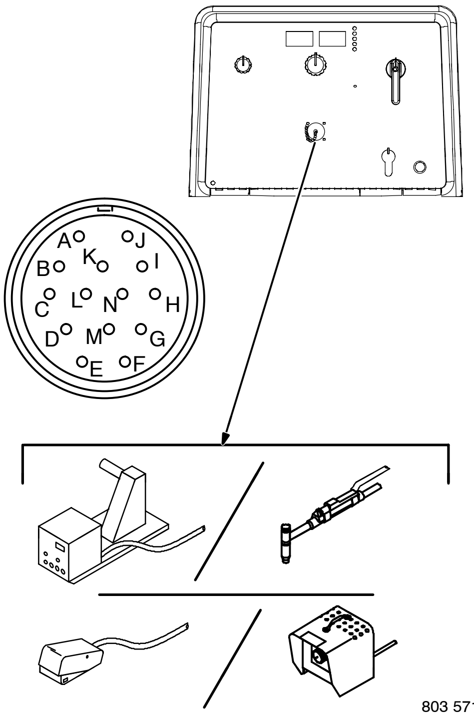
S-0007-F

***For distances longer than those shown in this guide, call a factory applications representative at 920-735-4505.

5-10. Remote Receptacle Information

NOTE ☞

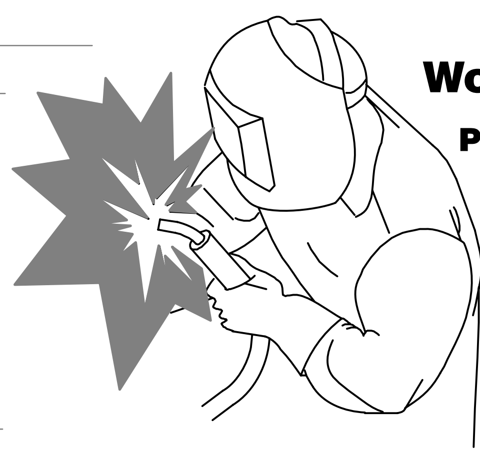
Engine runs at weld/power speed whenever a device connected to the remote receptacle is running.



REMOTE 14	Socket*	Socket Information
24 VOLTS AC OUTPUT (CONTACTOR)	A	24 volts ac. Protected by supplementary protector CB4.
	B	Contact closure to A completes 24 volt ac contactor control circuit and keeps engine at Run speed in all Wire modes.
115 VOLTS AC OUTPUT (CONTACTOR)	I	115 volts ac. Protected by supplementary protector CB3.
	J	Contact closure to I completes 115 volts ac contactor control circuit.
REMOTE OUTPUT CONTROL	C	+10 volts dc output to remote control.
	D	Remote control circuit common.
	E	0 to +10 volts dc input command signal from remote control.
A/V AMPERAGE VOLTAGE	F	Current feedback: 1 volt per 100 amperes.
	H	Voltage feedback: 1 volt per 10 arc volts.
GND	G	Circuit common for 24 and 115 volts ac circuits.
	K	Chassis common.

*The remaining sockets are not used.

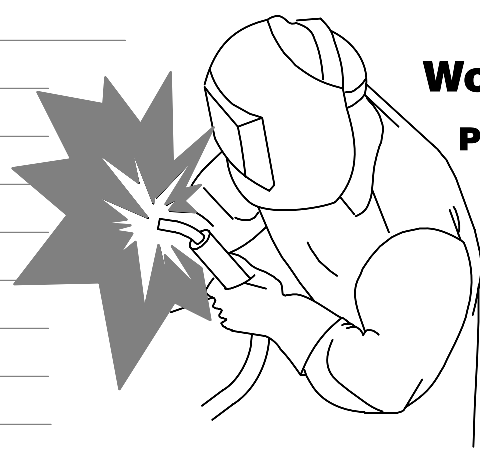
Notes



Work like a Pro!

Pros weld and cut safely. Read the safety rules at the beginning of this manual.

Notes



Work like a Pro!

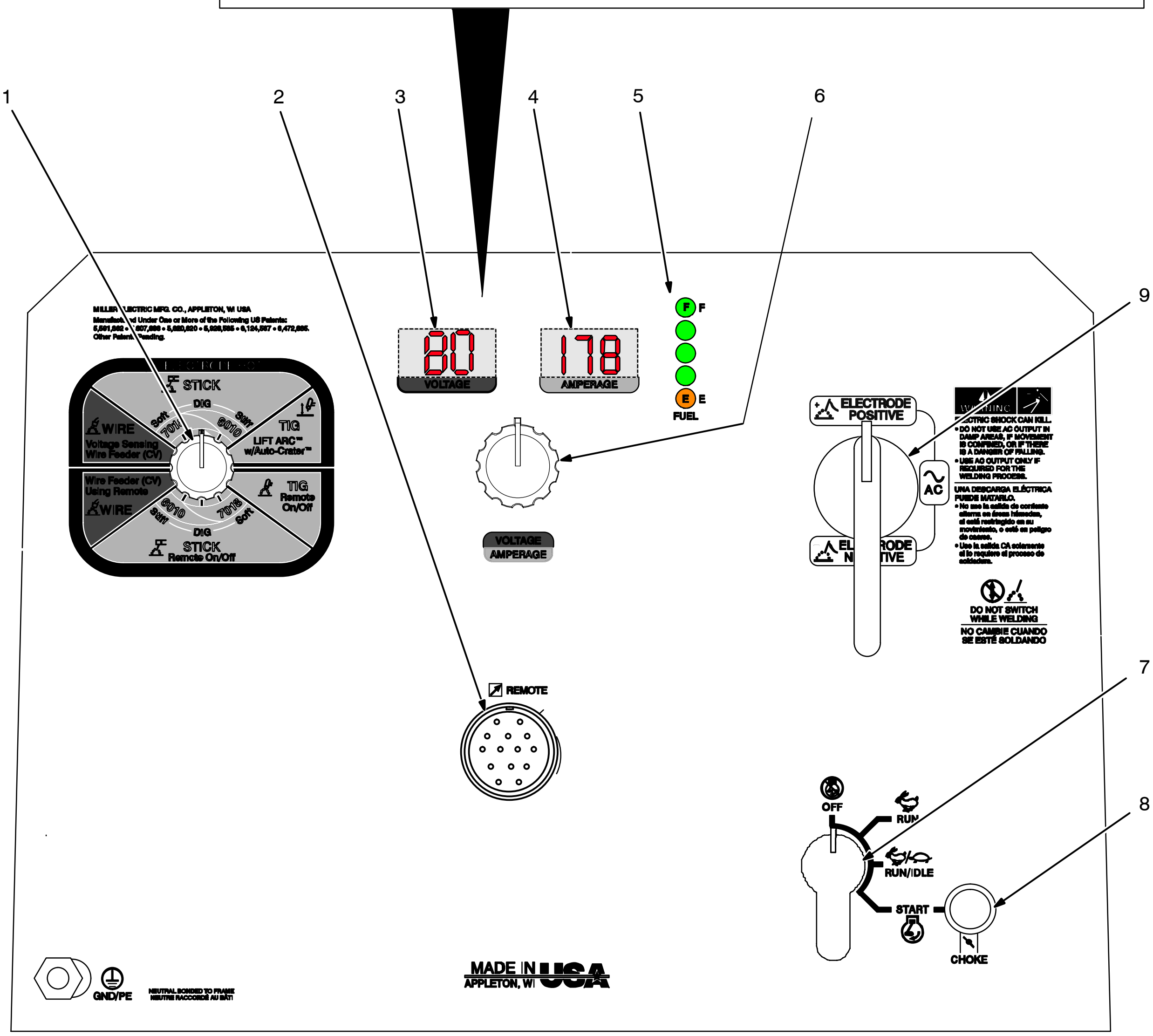
Pros weld and cut safely. Read the safety rules at the beginning of this manual.

SECTION 6 – OPERATING WELDING GENERATOR

6-1. Front Panel Controls (See Section 6-2)

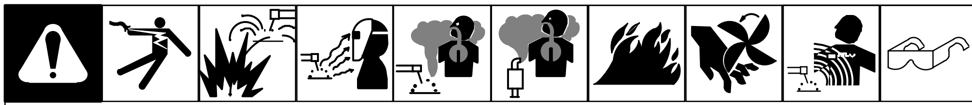
METER MAINTENANCE FUNCTIONS

- **HOUR METER:** with engine off, place Engine Control switch in RUN position to view engine hours.
- **OIL CHANGE INTERVAL:** with engine off, place Engine Control switch into the RUN/IDLE position to see hours before next oil change. Oil hours start at 100 and count down to 0 (oil change due).
  NOTE: Negative hours indicated when past recommended oil change interval.
  TO RESET: Cycle Engine Control switch from the RUN/IDLE to RUN position 3 times.
- **ENGINE RPM's:** With engine running and the Process Selector switch in any Stick HOT position, cycle Engine Control switch from the RUN/IDLE to RUN position 3 times and meters will display Engine RPM's. Use to check and set both idle and run speed RPM's. Accuracy is ±16 RPM's. Turn machine off to reset display.



Ref. 216 170 / Ref. 227 723-A

6-2. Description Of Front Panel Controls (See Section 6-1)



1 Process/Contactor Switch

See Section 6-4 for Process/Contactor switch information.

2 Remote Receptacle

Use receptacle to connect remote control or wire feeder.

When a remote voltage/amperage control is connected to the Remote receptacle, the Auto Sense Remote feature automatically switches voltage/amperage control to the remote control (see Sections 5-10 and 6-8).

With remote voltage/amperage control connected, weld output in CC mode is determined by a combination of front panel and remote control voltage/amperage settings. In CV mode, weld output is controlled through remote control only.

If no remote voltage/amperage control is connected to the Remote receptacle, the front panel Voltage/Amperage control adjusts voltage and amperage.

3 And 4 Displays

Displays can show weld process information (voltage and amperage) or maintenance information (hourmeter, oil change countdown, or rpm).

Meter Weld Functions: In Wire modes, Voltmeter displays preset weld voltage when not welding. Meters display actual voltage and amperage when welding and for five seconds after welding has stopped.

In Stick and TIG modes, Voltmeter reads ON and Ammeter displays preset amperage when not welding. Meters display actual voltage and amperage when welding and for five seconds after welding has stopped.

Meter Engine Maintenance Functions: See inset from maintenance label.

5 Fuel Level Indicator

With Engine running or Engine Control switch in Run or Run/Idle position, LED's indicate fuel left in tank.

6 Voltage/Amperage Control

Use control to select weld voltage or amperage. Control may be adjusted while welding.

With Process/Contactor switch in any Stick or TIG setting, use control to adjust amperage. With Process/Contactor switch in any Wire position, use control to adjust voltage. When a remote voltage/amperage control is connected to Remote receptacle RC4, control sets the maximum amperage in Stick and TIG modes, but has no effect in MIG modes.

7 Engine Control Switch

Use switch to start engine, select speed, and stop engine. In Run/Idle position, engine runs at idle speed at no load, and weld/power speed under load. In Run position, engine runs at weld/power speed.

Use switch in combination with meters to determine total engine hours and hours until next recommended oil change (see items 3 and 4 earlier in this section).

☞ *The unit will not return to idle speed when the remote contactor is on and Process/Contactor switch is in any Wire position. The unit will return to idle speed in all other modes.*

8 Engine Choke Control

Use control to change engine air-fuel mix when starting engine.

To Start: pull out choke and turn Engine Control switch to Start position. Release switch and slowly push choke in when engine starts.

☞ *If the engine does not start, let the engine come to a complete stop before attempting restart.*

☞ *During cold weather some gasoline engines encounter difficulties that are easily remedied. See Section 6-3 and 8-12.*

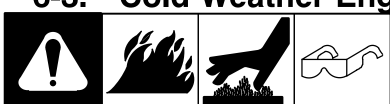
To Stop: turn Engine Control switch to Off position.

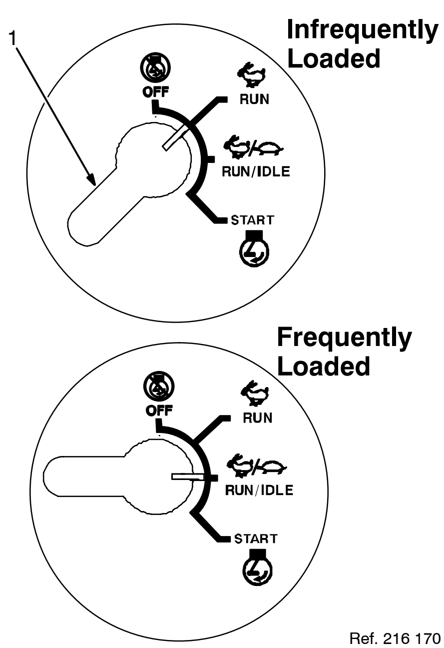
9 DC Polarity/AC Switch (AC/DC Models Only)

▲ **Do not switch under load.**

Use switch to select AC weld output or polarity of DC weld output.

6-3. Cold Weather Engine Operation





Ref. 216 170

1 Engine Control Switch

Carburetor Icing

Carburetor icing causes the unit to drop below the normal idle speed and then stall. This condition occurs when the temperature is near freezing and the relative humidity is high. Ice forms on the throttle plate and inner bore of the carburetor. The engine typically restarts without problems but soon stalls again.

- Treat gasoline with a fuel de−icer product (isopropyl alcohol).
- Place the Engine Control switch in the Run position.
- Run engine only when expecting to frequently load it.

Breather Icing

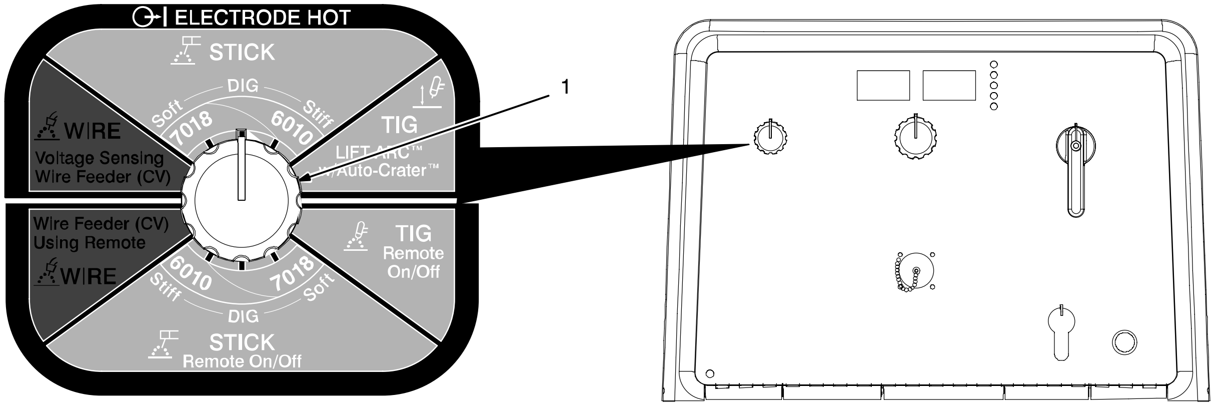
Oil breather/pulse line icing occurs in severe cold (continuously below 0°F). Moisture accumulates in the oil from piston ring blow−by if the engine is extensively idled. This may cause vacuum line freezing, oil breather tube freezing or ice in the carburetor. All of these cause operating problems. Due to ice in the lines, the engine may not restart until it is warmed to above freezing.

- Load engine and reduce idle times to prevent engine shutdowns.
- Use an electric fuel pump to avoid pulse line freezing.
- Install engine cold−weather kit.

Both Kohler (1-800-544-2444) and Robin (1-800-277-6246) offer kits for cold weather operation. The user can install these kits. Both kits pull heated air from the muffler surface into the carburetor and shut the cold air off. This increases engine temperature during operation in both idle and high speed.

☞ *When the ambient temperatures become warmer (above 45°F) the air flow will have to be returned to normal.*

6-4. Process/Contactor Switch On AC/DC Models



803 571–A / 216 170–A

1 Process/Contactor Switch

▲ **Weld output terminals are energized when Process/Contactor switch is in an Electrode Hot position and the engine is running.**

☞ *The unit will not return to idle speed when Process/Contactor switch is in a Wire position and the remote contactor is on (closure between pins A and B on remote receptacle).*

Use switch to select weld process and weld output on/off control (see table below and Section 5-10).

Place switch in Remote positions to turn weld output on and off with a device connected to the remote receptacle.

Place switch in Electrode Hot positions for weld output to be on whenever the engine is running.

Wire Positions:

Use Wire positions for MIG welding using a voltage sensing wire feeder (Electrode Hot) or wire feeder using remote control.

Stick Positions:

Use Stick positions for stick (SMAW) and air carbon arc (CAC-A) cutting and gouging.

When switch is in a Stick mode, select one of four dig settings to provide additional amperage during short arc length conditions and help prevent electrodes from “sticking”. See Stick position descriptions following (reading L to R):

Soft Arc (E 7018) (Position 1) - This setting provides a low dig/arc force setting for smooth weld performance. A stable weld puddle with little arc “snap” gives excellent weld bead appearance with minimal spatter.

Medium Soft Arc (Position 2) - This setting provides a low to medium dig/arc force that gives a slightly more fluid weld puddle, more arc “snap”, and reduces the potential for electrode sticking at shorter arc lengths.

Medium Stiff Arc (Position 3) - This setting provides medium dig/arc force for open root vertical up joints or joints that do not require additional current for fit up inconsistencies.

Stiff Arc (E6010) (Position 4) - This setting provides a high dig/arc force for open root vertical down joints where additional current is needed to compensate for tight joint fit up without the need to increase overall welding current. This setting is recommended for those who prefer a very stiff arc with 6010 electrodes.

The dig circuit is disabled when switch is in Wire or TIG positions.

TIG Positions :

TIG – Remote On/Off – Use this position for AC or DC TIG welding using remote on/off control.

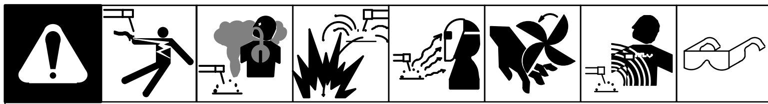
Electrode Hot – Lift-Arc™ w/Auto Crater™ TIG (DC only) - With switch in this position, normal open-circuit voltage is not present between the electrode and workpiece. A solid-state contactor energizes after the electrode touches the workpiece, preventing overheating, sticking, or contamination of the electrode (see Sections 6-5 and 6-6).

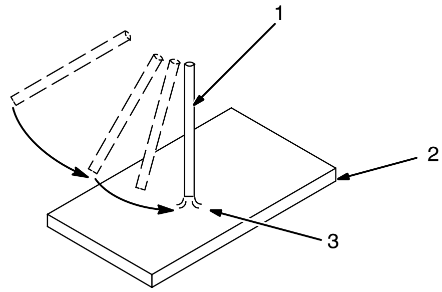
End the arc using either the Auto-Crater or Auto-Stop feature (see Section 6-7).

Process/Contactor Switch Settings

Switch Setting	Process	Output On/Off Control
Electrode Hot – Wire	MIG (GMAW)	Electrode Hot
Electrode Hot – Stick	Stick (SMAW) Select Preferred Dig	Electrode Hot
Electrode Hot – Stick	Air Carbon Arc (CAC-A) Cutting And Gouging Select Any Dig	Electrode Hot
Electrode Hot – Lift Arc w/ Auto-Crater	TIG (GTAW) Lift Arc w/Auto-Crater (GTAW) (DC Only)	Electrode Hot
TIG – Remote On/Off	GTAW With HF Unit, Pulsing Device, Or Remote Control (AC or DC)	At Remote Receptacle
Stick – Remote On/Off	Stick (SMAW) With Remote On/Off	At Remote Receptacle
Wire – Wire Feeder (CV) Using Remote	MIG (GMAW)	At Remote Receptacle

6-5. Stick Start Procedure – Scratch Start Technique





With Stick selected, start arc as follows:

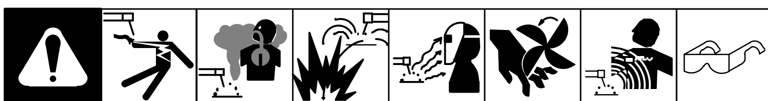
1 Electrode

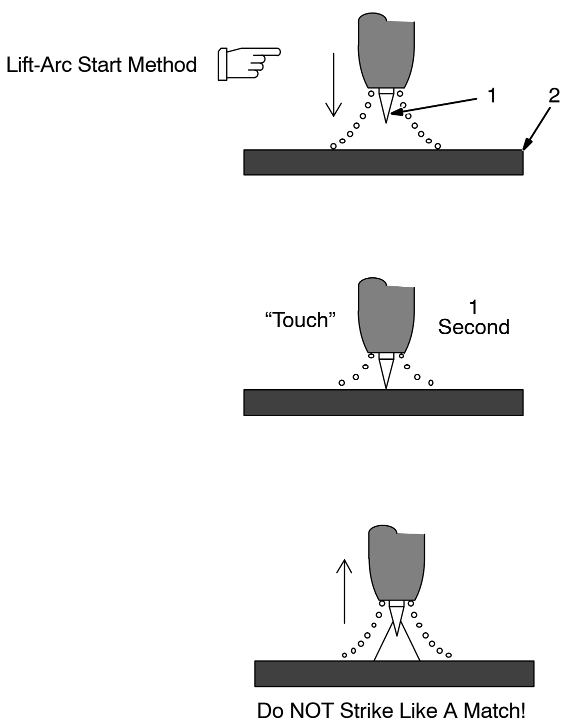
2 Workpiece

3 Arc

Drag electrode across workpiece like striking a match; lift electrode slightly after touching work. If arc goes out electrode was lifted to high. If electrode sticks to workpiece, use a quick twist to free it.

6-6. TIG Lift-Arc™ Start Procedure





Select Lift-Arc™/Scratch Start TIG at Process/Contactor switch to achieve great arc starts with either procedure. Perform Lift-Arc starting method as follows:

Lift-Arc ™ TIG

1 TIG Electrode

2 Workpiece

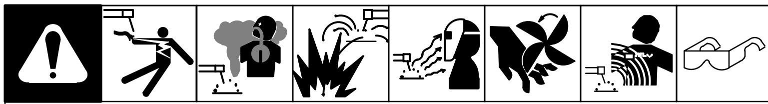
Turn gas on. Touch tungsten electrode to workpiece at weld start point. **Hold electrode to workpiece for 1 second**, and slowly lift electrode. Arc is started when electrode is lifted.

Normal open-circuit voltage is not present before tungsten electrode touches workpiece; only a low sensing voltage is present between electrode and workpiece. The solid-state output contactor does not energize until after electrode is touching workpiece. This allows electrode to touch workpiece without overheating, sticking, or getting contaminated.

Application:

Lift-Arc is used for the DCEN GTAW process when HF Start method is not permitted.

6-7. Ending The TIG Arc With Auto-Crater™ And Auto-Stop™



Maintain shielding gas coverage and eliminate tungsten and workpiece contamination by using Auto-Crater or Auto-Stop to end the arc.

Using Auto-Crater:

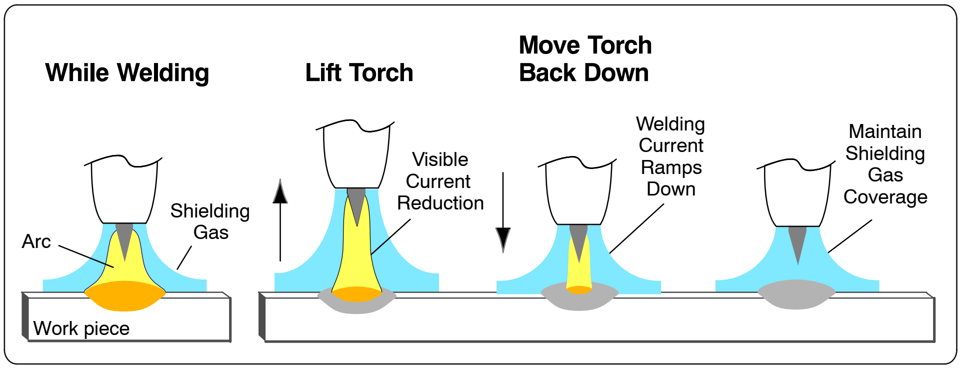
☞ *Remote control is not needed when using Auto-Crater..*

- Lift torch slightly to start Auto-Crater end (current is reduced).
- Lower torch. Shielding gas continues until shut off.

Using Auto-Stop:

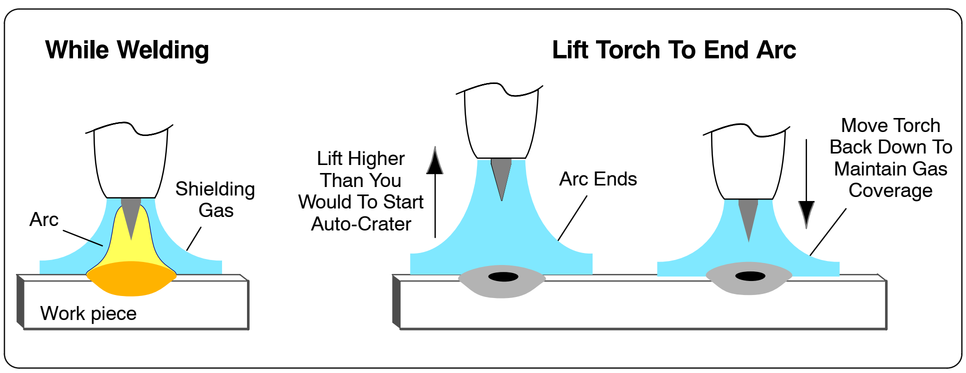
- Lift torch slightly to start Auto-Stop. (Lift higher than that needed to start Auto-Crater.)
- Arc stops.
- Move torch back down to maintain gas coverage and prevent contamination.

Ending Arc Using Auto-Crater



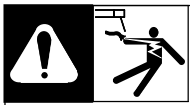
OR

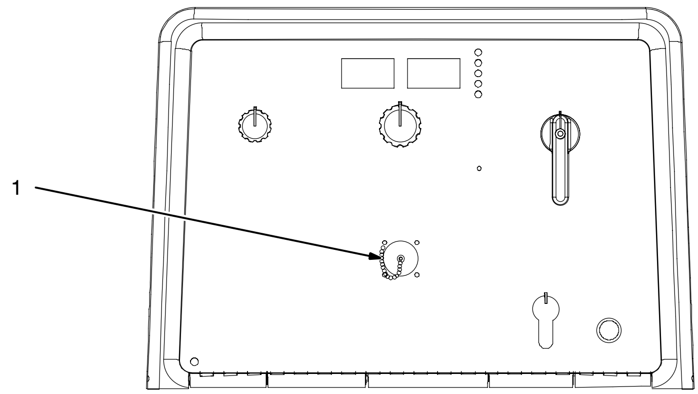
Ending Arc Using Auto-Stop



Marketing (WM)

6-8. Remote Voltage/Amperage Control





1 Remote Receptacle RC4

Connect optional remote voltage/ amperage (V/A) control to RC4 (see Section 5-10).

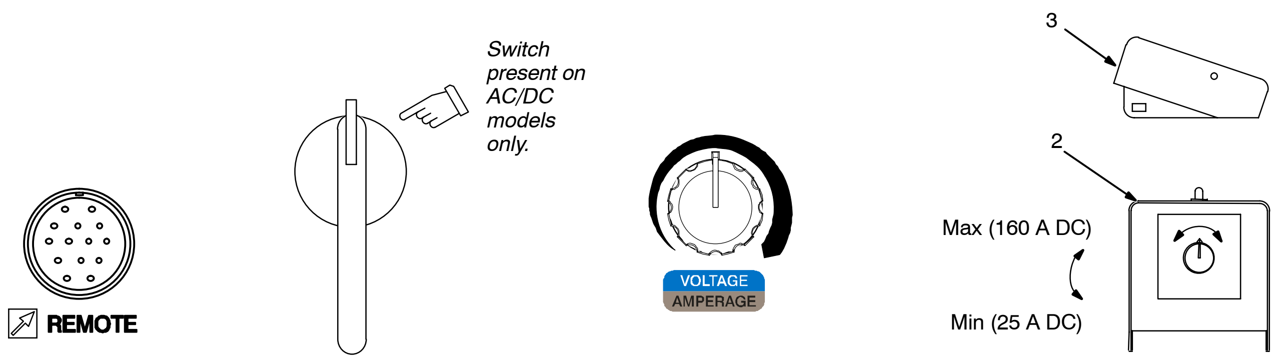
With remote control connected, weld output in a CC mode (Stick, TIG) is determined by a combination of front panel and remote control voltage/amperage settings. In CV mode (Wire), weld output is controlled through remote control only.

2 Remote Hand Control (Optional)

3 Remote Foot Control (Optional)

☞ *Engine runs at weld/power speed in Wire mode whenever a device connected to the remote receptacle makes closure between pins A and B. In all other modes, the engine runs at idle speed until a load is applied.*

In Example:
Process = Stick (Using Remote On/Off)
Min = 25 A CC/DC
Max = 160 A CC/DC



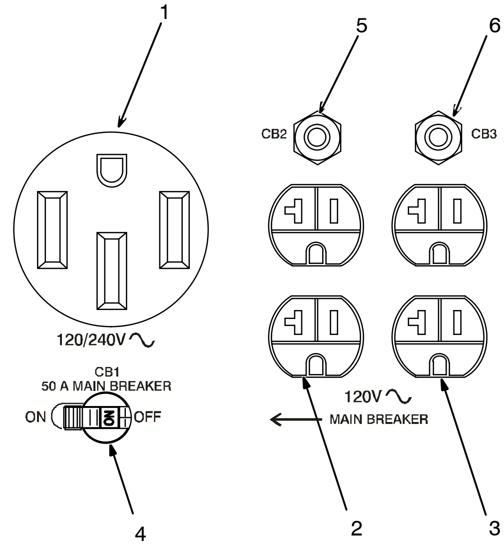
Connect Remote V/A Control To Remote Receptacle RC4 → Select Polarity By Using DC Polarity/AC Switch (If Present) Or By Changing Cable Connections → Set V/A Control (Mid-Range: About 160 A) → Adjust Remote V/A Control (Stick Welding Only)

803 571–A / 216 170–A / S-0769 / S-0774

SECTION 7 – OPERATING AUXILIARY EQUIPMENT

7-1. Generator Power Receptacles And Supplementary Protectors





Ref. 216 170

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

☞ *Generator power decreases as weld current increases.*

1 240 V 50 A AC Receptacle RC1

RC1 supplies 60 Hz single-phase power at weld/power speed. Maximum output is 9.5 kVA/kW.

2 120 V 20 A AC Duplex Receptacle RC2

3 120 V 20 A AC Duplex Receptacle RC3

RC2 and RC3 supply 60 Hz single-phase power at weld/power speed. Maximum output from RC2 or RC3 is 2.4 kVA/kW (20 A x 120 V).

4 Supplementary Protector CB1

CB1 protects receptacles RC1, RC2, RC3, and 115 volt ac output to Remote Receptacle RC4 from overload. If CB1 opens, the receptacles do not work and 115 volt ac output to Remote Receptacle RC4 stops. Place switch in On position to reset.

5 Supplementary Protector CB2

6 Supplementary Protector CB3

CB2 protects RC2 from overload. CB3 protects RC3 and the 115 volt ac output to Remote Receptacle RC4 from overload. If CB2 opens, RC2 does not work. If CB3 opens, RC3 does not work and the 115 volt ac output to RC4 stops. Press button to reset.

☞ *If supplementary protector continues to open, contact Factory Authorized Service Agent.*

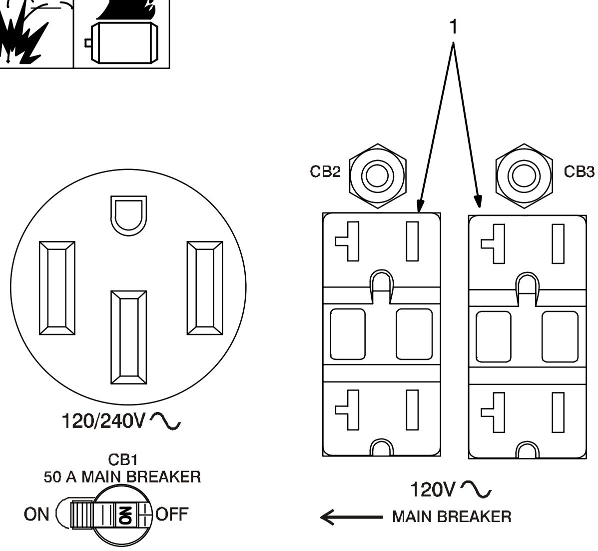
Combined output of all receptacles limited to 10 kVA/kW rating of the generator.

EXAMPLE: If 20 A is drawn from each 120 V duplex receptacle, only 20 A is available at the 240 V receptacle:

2 x (120 V x 20 A) + (240 V x 20 A) = 9.6 kVA/kW

7-2. Optional GFCI Receptacles





▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

☞ *Generator power decreases as weld current increases.*

Combined output of all receptacles limited to 10 kVA/kW rating of the generator.

GFCI Receptacle Option

1 120 V 20 A AC GFCI Receptacles GFCI-2 and GFCI-3

GFCI2 and GFCI3 supply 60 Hz single-phase power at weld/power speed. Maximum output from GFCI-2 or GFCI-3 is 2.4 kVA/kW. Circuit protection is the same as standard receptacles.

If a ground fault is detected, the GFCI Reset button pops out and the circuit opens to disconnect the faulty equipment. Check for damaged tools, cords, plugs, etc. connected to the receptacle. Press button to reset receptacle and resume operation.

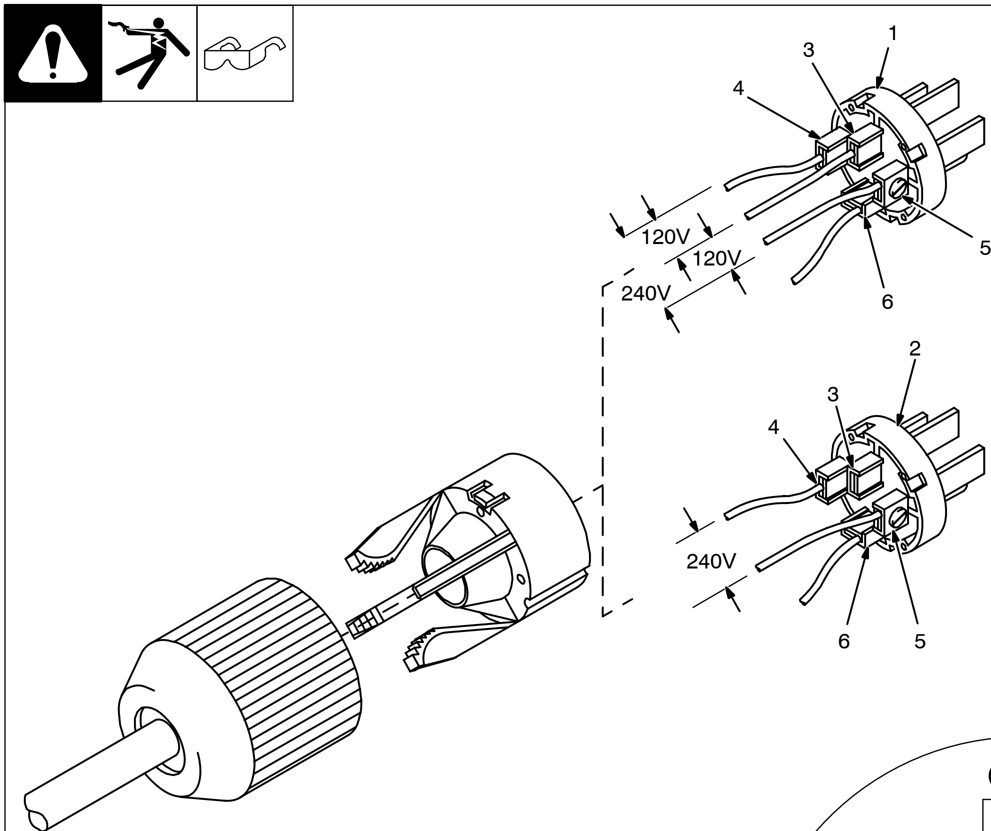
☞ *At least once a month, run engine at weld/power speed and press Test button to verify GFCI is working properly.*

Ref. 216 170

7-3. Simultaneous Weld And Power

Weld Current in Amperes	Total Power in Watts	120 V Receptacle Amperes	240 V Receptacle Amperes
300	1000	10	5
250	3500	31	15
200	5200	46	23
150	6700	60	30
100	8000	70	35
0	10,500 (Peak)	88	44

7-4. Wiring Instructions For Optional 240 Volt, Single-Phase Plug (NEMA 14-50P)



The plug can be wired for a 240 V, 2-wire load or a 120/240V, 3-wire load. See circuit diagram.

1 Plug Wired for 120/240 V, 3-Wire Load

When wired for 120 V loads, each duplex receptacle shares a load with one half of 240 V receptacle.

2 Plug Wired for 240 V, 2-Wire Load

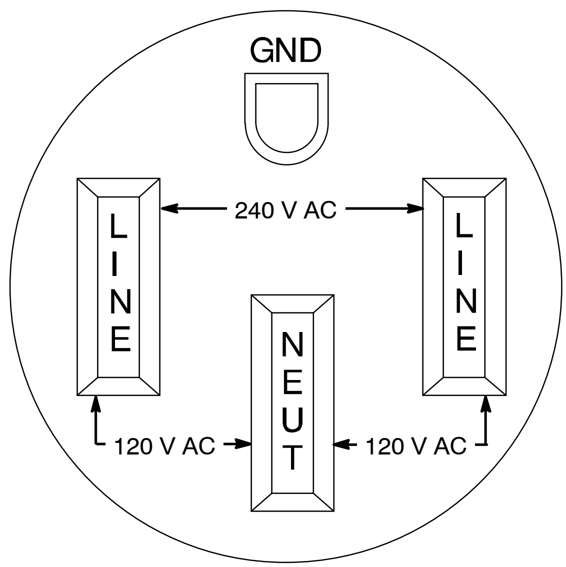
3 Neutral (Silver) Terminal

4 Load 1 (Brass)Terminal

5 Load 2 (Brass) Terminal

6 Ground (Green) Terminal

7 Amperes Available using 120/240 V Plug



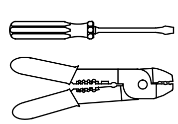
7

Current Available in Amperes	
240 V Receptacle*	**Each 120 V Duplex Receptacle**
0	20
5	20
10	20
15	20
20	20
25	15
30	10
35	5
40	0

V x A = Watts

*One 240 V load or two 120 V loads.

Tools Needed:



plug1 11/03 – 120 813-D

SECTION 8 – MAINTENANCE & TROUBLESHOOTING

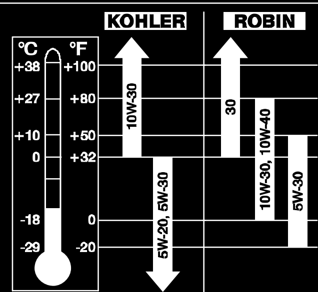
8-1. Maintenance Label

KOHLER CH20/CH23, ROBIN EH64/EH65 GAS ENGINES

See Engine Manual for complete engine care. Give Engine Specification and Serial Number when ordering parts.

Check Daily.

To Drain Oil:
Push And Turn CCW
Pull



Recommended Oil API Service Classification . . .	SG or higher (If using LP fuel, use synthetic oil.)
Oil Change	100 hours
Oil Filter Change	200 hours
Oil Filter	**KOHLER:** MILLER 066 698, Kohler 1205001 **ROBIN:** MILLER 198 754, Robin 248-65801-00
Oil Capacity w/filter change .	Approximately 1.5 quarts
DO NOT OVERFILL . .	**KOHLER:** *Keep oil level between **L & F** marks on dipstick.* **ROBIN:** *Keep oil level between **2 holes** on dipstick.*
NO SOBRELLENE . . .	**KOHLER:** *Mantenga el nivel del aceite entre las marcas **L y F** del medidor.* **ROBIN:** *Mantenga el nivel del aceite entre los **dos huecos** del medidor.*

Gasoline

Fuel Grade. . . . . Unleaded, 87 Octane min.
Fuel Filter . . . . **KOHLER:** MILLER 215 984, Kohler 2505022
ROBIN: MILLER 215 984, Robin 263-65012-A3

12 Volt Battery. . . . . BCI Group 58
Cranking Performance at 0°F (-18°C). . . . 430 Amps min.

Air Filter Service . . . . 100 hours – see Owner's Manual
Air Filter . . . . **KOHLER:** MILLER 230 016, Kohler 2408303-S
Air Filter Wrapper . . . . **KOHLER:** MILLER 230 017, Kohler 2408305-S
Air Filter . . . . **ROBIN:** MILLER 198 755, Robin 263-32610-A1
(Includes Air Filter Wrapper)

METER MAINTENANCE FUNCTIONS*

- **HOUR METER:** with engine off, place Engine Control switch in RUN position to view engine hours.
- **OIL CHANGE INTERVAL:** with engine off, place Engine Control switch into the RUN/IDLE position to see hours before next oil change. Oil hours start at 100 and count down to 0 (oil change due).
NOTE: Negative hours indicated when past recommended oil change interval.
TO RESET: Cycle Engine Control switch from the RUN/IDLE to RUN position 3 times.
- **ENGINE RPM's:** With engine running and the Process Selector switch in any Stick HOT position, cycle Engine Control switch from the RUN/IDLE to RUN position 3 times and meters will display Engine RPM's. Use to check and set both idle and run speed RPM's. Accuracy is ±16 RPM's. Turn machine off to reset display.

*For Miller Legend, see Owner's Manual.

FUNCIONES DE MANTENIMIENTO DE LOS MEDIDORES*

- **HORÓMETRO:** con el motor apagado, ponga el control del motor en la posición RUN (marcha) para ver las horas en el motor.
- **INTERVALO DEL CAMBIO DE ACEITE:** con el motor apagado, ponga el CONTROL DEL MOTOR en la posición RUN/IDLE (marcha/ralentí) para ver las horas que quedan antes del cambio de aceite. Las horas comienzan en 100 y descienden a 0 (momento de cambiar el aceite).
NOTE: Horas negativas indican que se a sobre pasado el intervalo del cambio del aceite.
PARA REARMAR: Cicle el control del motor de la posición RUN/IDLE a RUN tres veces.
- **RPMs DEL MOTOR:** Con el motor funcionando y el interruptor de controlar el proceso en cualesquiera posición "Stick HOT", cicle el control del motor de la posición RUN/IDLE a RUN 3 veces y los medidores mostrarán el RPM DEL MOTOR. Úselo para chequear y fijar ambas velocidades de ralentí y marcha. La precisión es ±16 RPMs. Apague la máquina para rearmar la pantalla.

*Para la Legend de Miller, vea el manual del dueño.

Engine Speed No Load	High Speed . . . . 3675-3750 RPM Idle. . . . . 2200-2300 RPM Miller Legend . . . See Owner's Manual

Spark Plug . . . . **KOHLER:** MILLER 067 007, Kohler 1213202, Champion RC-12YC
Gap: 0.030 in.
Spark Plug . . . . **ROBIN:** MILLER 198 777, Robin X65-01407-30, NGK BPR4EY
Gap: 0.025 in.
Use only resistor spark plugs and wires.

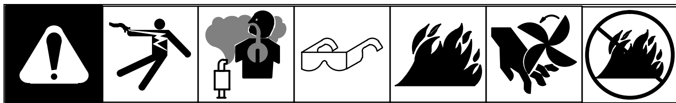
Tune-up and Filter Kit . . .(Includes Air, Oil and Fuel Filters, and 2 Spark Plugs)
KOHLER: MILLER 230 015
ROBIN: MILLER 199 062

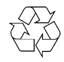
227 864-D

8-2. Routine Maintenance

Note ☞ *Also see Voltmeter/Ammeter displays to assist in scheduling maintenance (see Section 6-1). The Voltmeter and Ammeter display total engine operating hours at start-up.*

Note ☞ *Follow the storage procedure in the engine owner's manual if the unit will not be used for an extended period.*

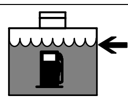
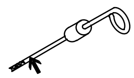
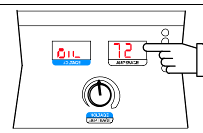
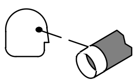
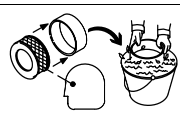
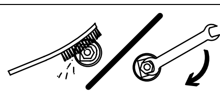
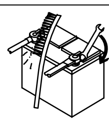
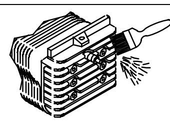
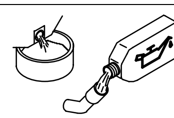
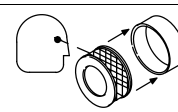
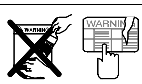
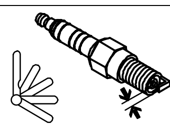
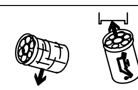
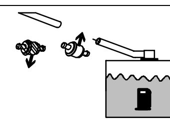
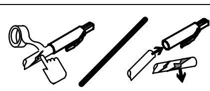
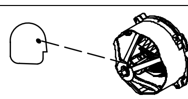
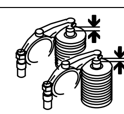
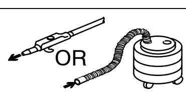




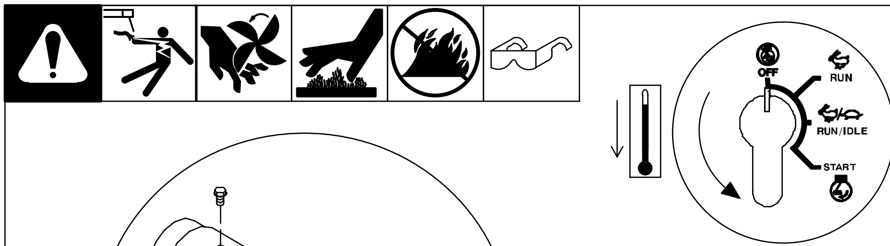
Recycle engine fluids.

▲ **Stop engine before maintaining.**

☞ *See Engine Manual and Maintenance Label for important start-up, service, and storage information. Service engine more often if used in severe conditions.*

	✓ = Check ◇ = Change ● = Clean ☆ = Replace * To be done by Factory Authorized Service Agent				Reference
Every **8** Hours	 ✓ Fuel Level	 ✓ Oil Level	 ✓ Meters for next oil change interval	 ● Oil, Fuel Spills	Section 5-2, 5-3, 6-2
Every **25** Hours	 ✓● Spark Arrestor Screen	 ● Air Cleaner Wrapper			Section 8-3, 8-4
Every **50** Hours	 ● Weld Terminals				
Every **100** Hours	 ● Battery Terminals	 ● Cooling System	 ◇ Oil	 ✓☆ Air Cleaner Element	Engine Manual, Section 8-4, 8-5, 8-6
Every **200** Hours	 ☆ Unreadable Labels	 ✓ Spark Plug Gap	 ◇ Oil Filter	 ☆ Fuel Filter	Engine Manual, Section 8-5, 8-6
Every **500** Hours	 ✓☆ Weld Cables	 ✓● Slip Rings* ✓☆ Brushes*	 ✓Valve Clearance*		Engine Manual
Every **1000** Hours	 ● Inside Unit				

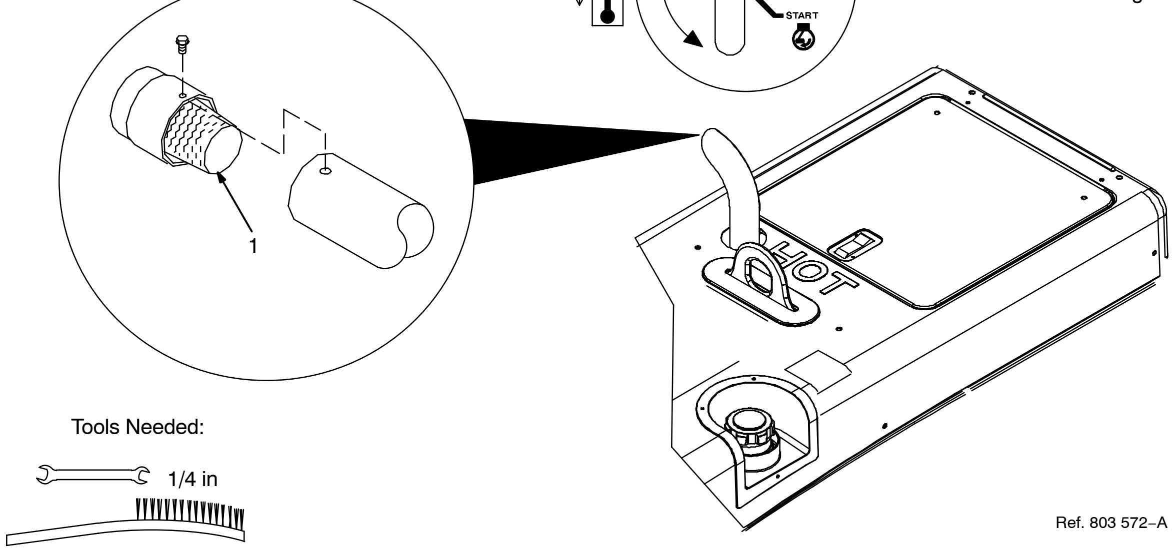
8-3. Servicing Optional Spark Arrestor



▲ **Stop engine and let cool.**

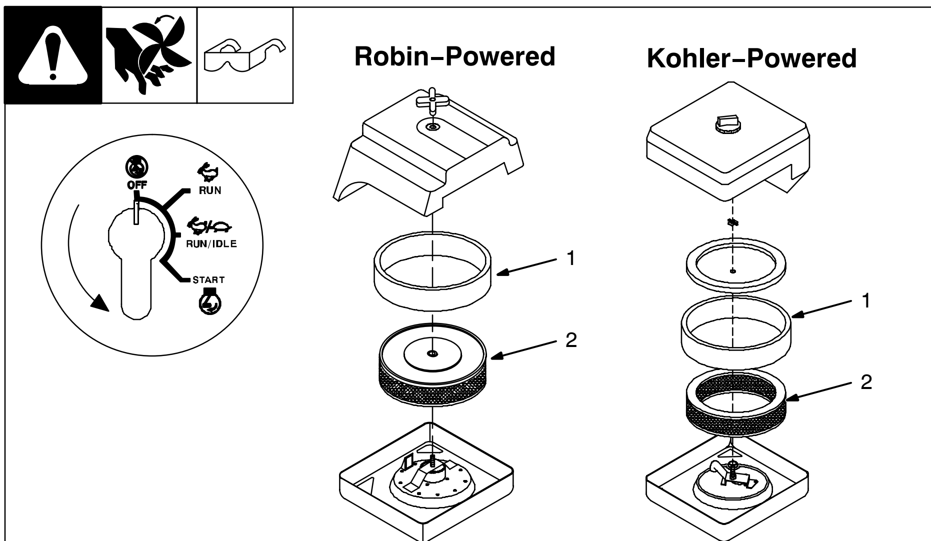
1 Spark Arrestor Screen

Clean and inspect screen. Replace spark arrestor if screen wires are broken or missing.



Ref. 803 572–A / Ref. 183 175–A

8-4. Servicing Air Cleaner



▲ **Stop engine.**

▲ **Do not run engine without air cleaner or with dirty element.**

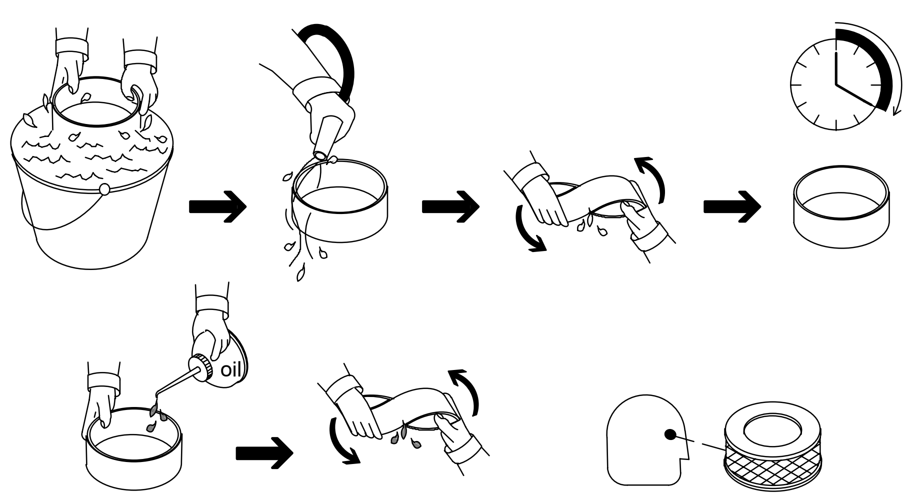
1 Precleaner

Wash precleaner with soap and water solution. Allow precleaner to air dry completely.

Spread 1 tablespoon SAE 30 oil evenly into precleaner. Squeeze out excess oil.

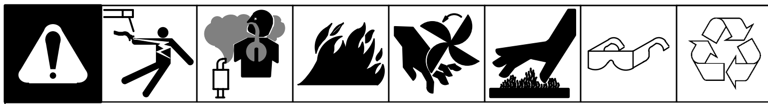
2 Element

Replace element if damaged, dirty, or oily.



aircleaner3 11/04 – 802 772 / 803 070 / S-0759

8-5. Changing Engine Oil, Oil Filter, And Fuel Filter (Kohler-Powered Units)



▲ **Stop engine and let cool.**

1 Oil Drain Valve

2 Oil Filter

Change engine oil and filter according to engine manual.

▲ **Close valve and valve cap before adding oil and running engine.**

Fill crankcase with new oil to full mark on dipstick (see Section 5-2).

3 Fuel Filter

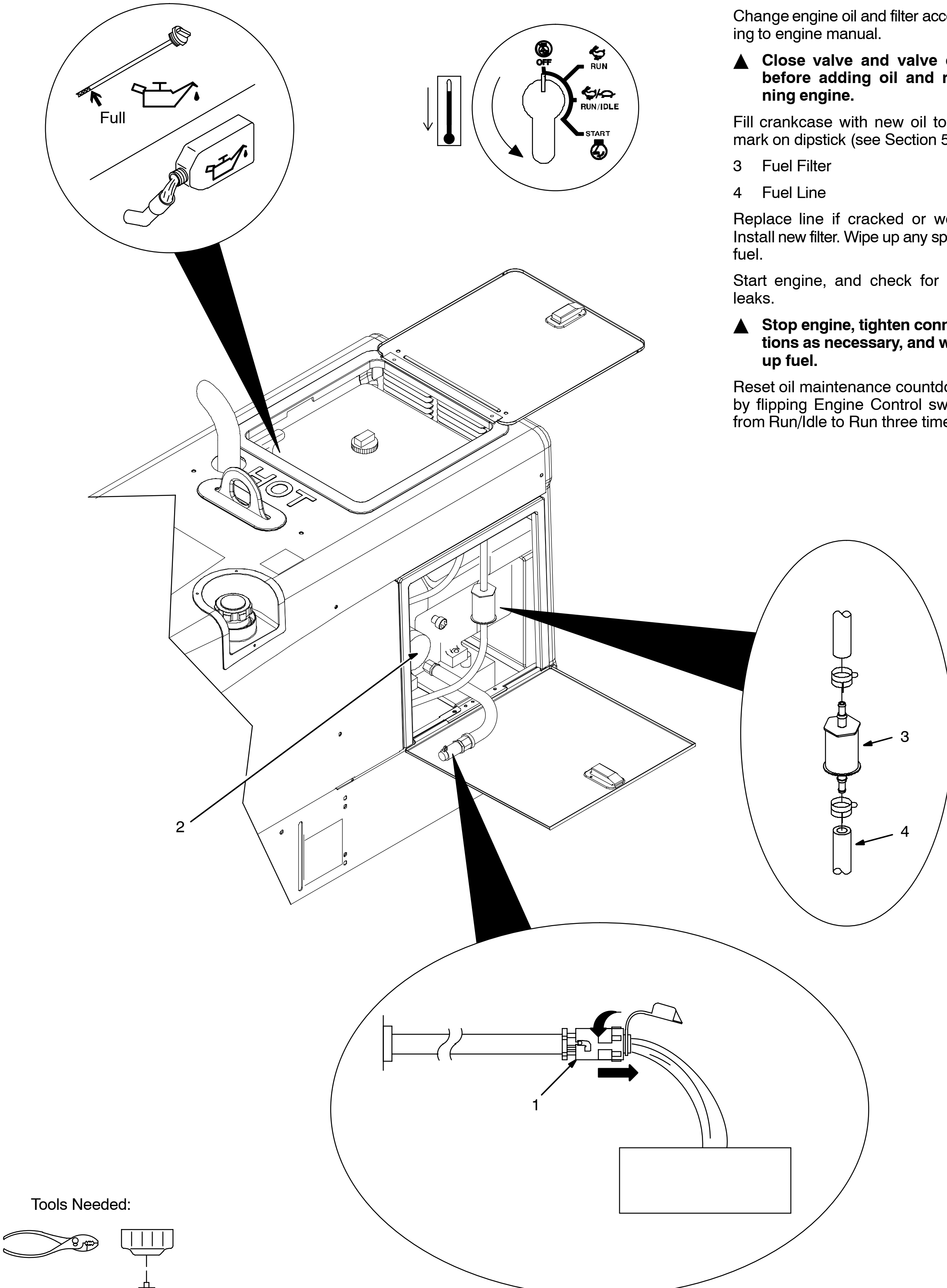
4 Fuel Line

Replace line if cracked or worn. Install new filter. Wipe up any spilled fuel.

Start engine, and check for fuel leaks.

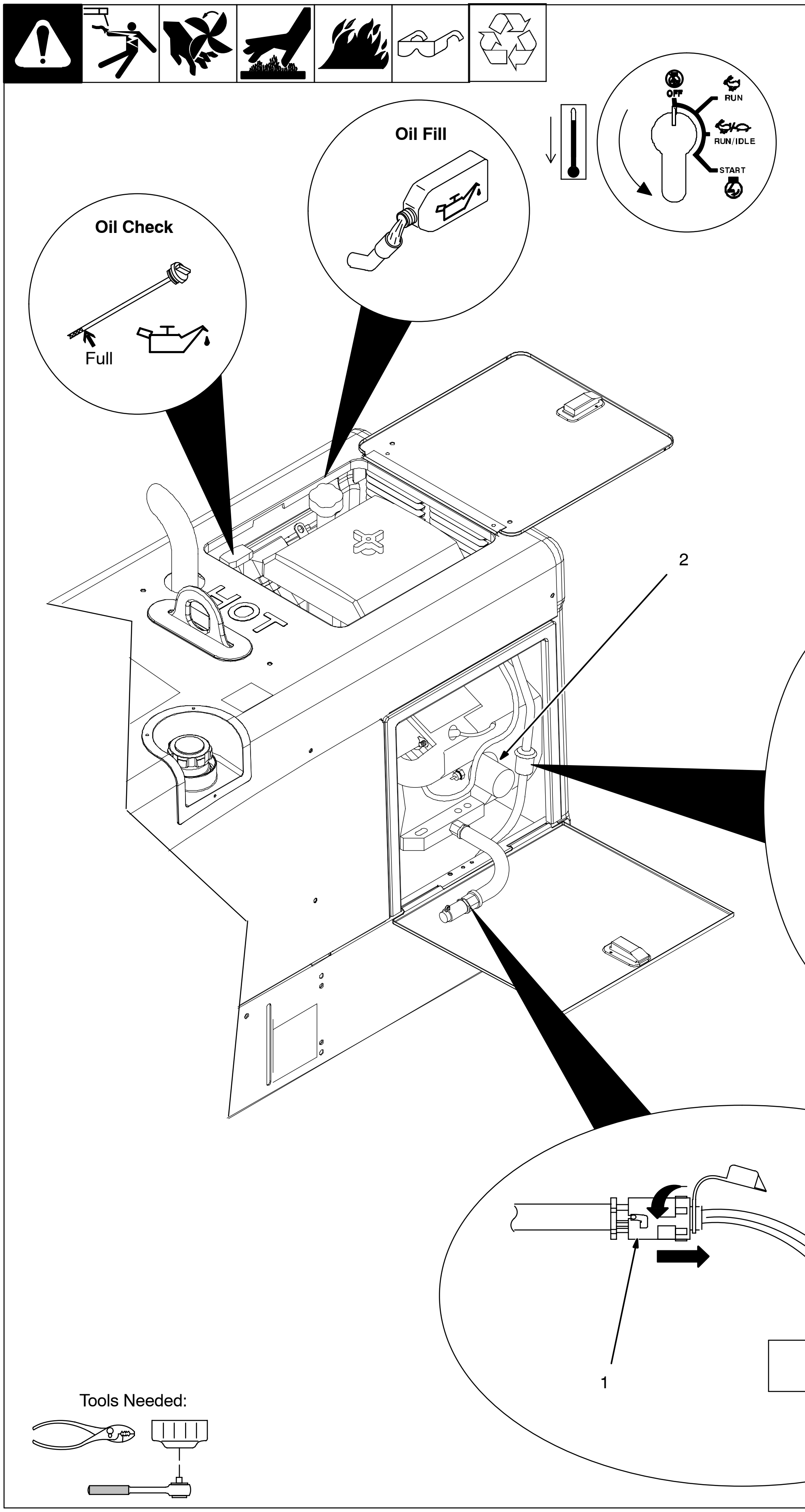
▲ **Stop engine, tighten connections as necessary, and wipe up fuel.**

Reset oil maintenance countdown by flipping Engine Control switch from Run/Idle to Run three times.



Ref. 803 573–A / S-0842

8-6. Changing Engine Oil, Oil Filter, and Fuel Filter (Robin-Powered Units)



▲ **Stop engine and let cool.**

1 Oil Drain Valve

2 Oil Filter

Change engine oil and filter according to engine owner's manual.

▲ **Close valve and valve cap before adding oil and running engine.**

Fill crankcase with new oil to full mark on dipstick (see Section 5-3).

3 Fuel Filter

4 Fuel Line

Replace line if cracked or worn. Install new filter. Wipe up any spilled fuel.

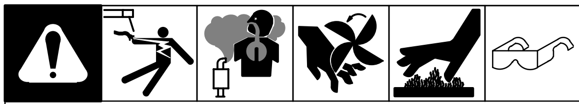
Start engine, and check for fuel leaks.

▲ **Stop engine, tighten connections as necessary, and wipe up fuel.**

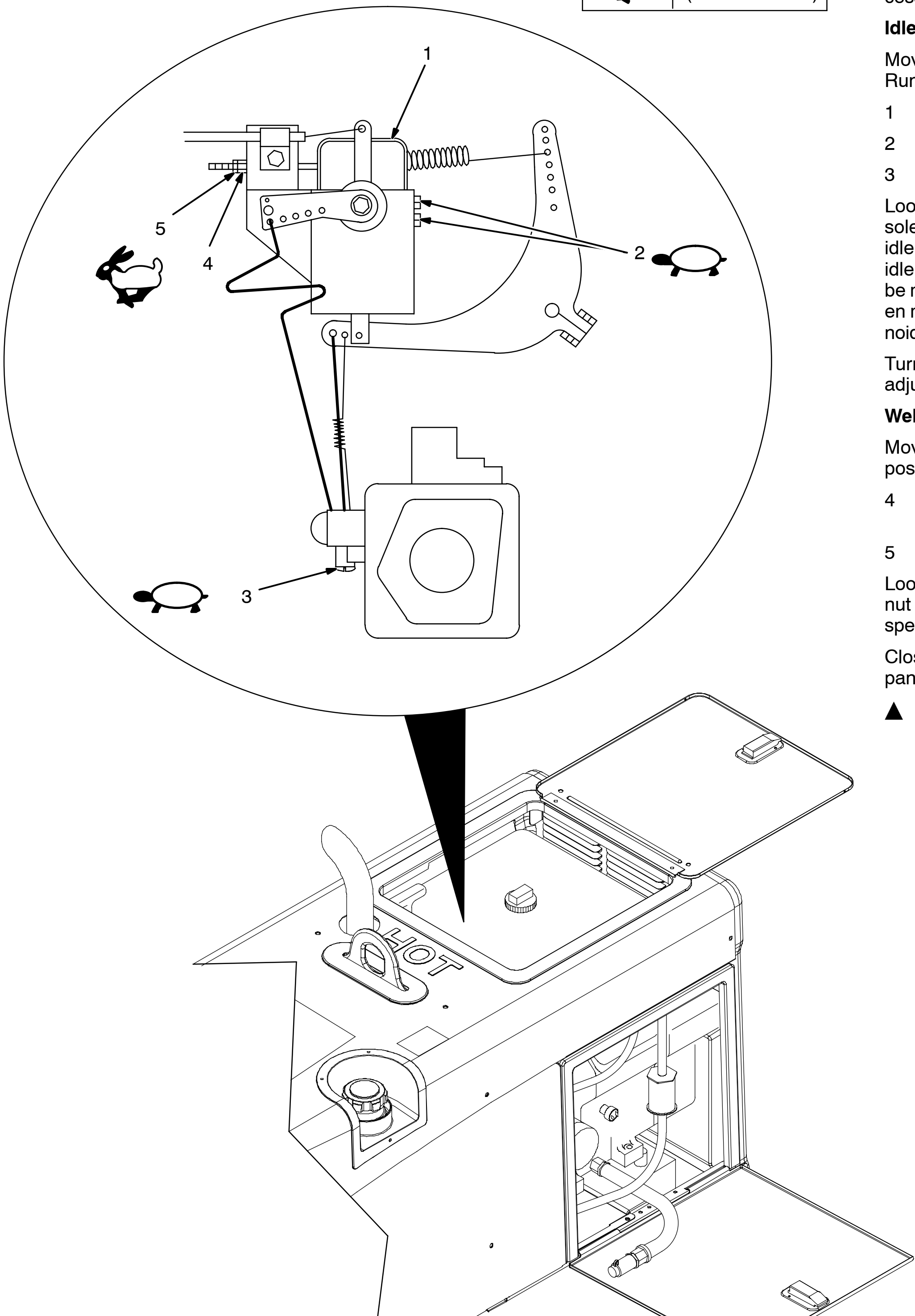
Reset oil maintenance countdown by flipping Engine Control switch from Run/Idle to Run three times.

803 572 / S-0842

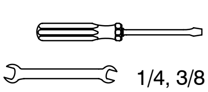
8-7. Adjusting Engine Speed (Kohler-Powered Units)



Idle	2200 – 2300 rpm (36.6 – 38.3 Hz)
Weld/Power	3675 – 3750 rpm (61.3 – 62.5 Hz)



Tools Needed:



After tuning engine, check engine speeds with a tachometer (see table). If necessary, adjust speeds as follows:

Start engine and run until warm. Turn A/V control to 10.

Open top cover access panel to access speed adjustments.

Idle Speed Adjustment

Move Engine Control switch to Run/Idle position.

1 Throttle Solenoid
2 Mounting Screws
3 Idle Speed Screw

Loosen mounting screws. Adjust solenoid position so engine runs at idle speed. If necessary, back out idle speed screw so solenoid can be moved to correct position. Tighten mounting screws. Be sure solenoid linkage works smoothly.

Turn idle speed screw for fine adjustments.

Weld/Power Speed Adjustment

Move Engine Control switch to Run position.

4 Weld/Power Speed Adjustment Nut
5 Lock Nut

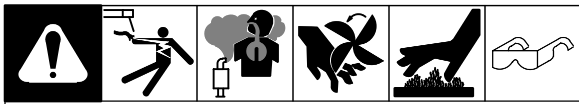
Loosen lock nut. Turn adjustment nut until engine runs at weld/power speed. Tighten lock nut.

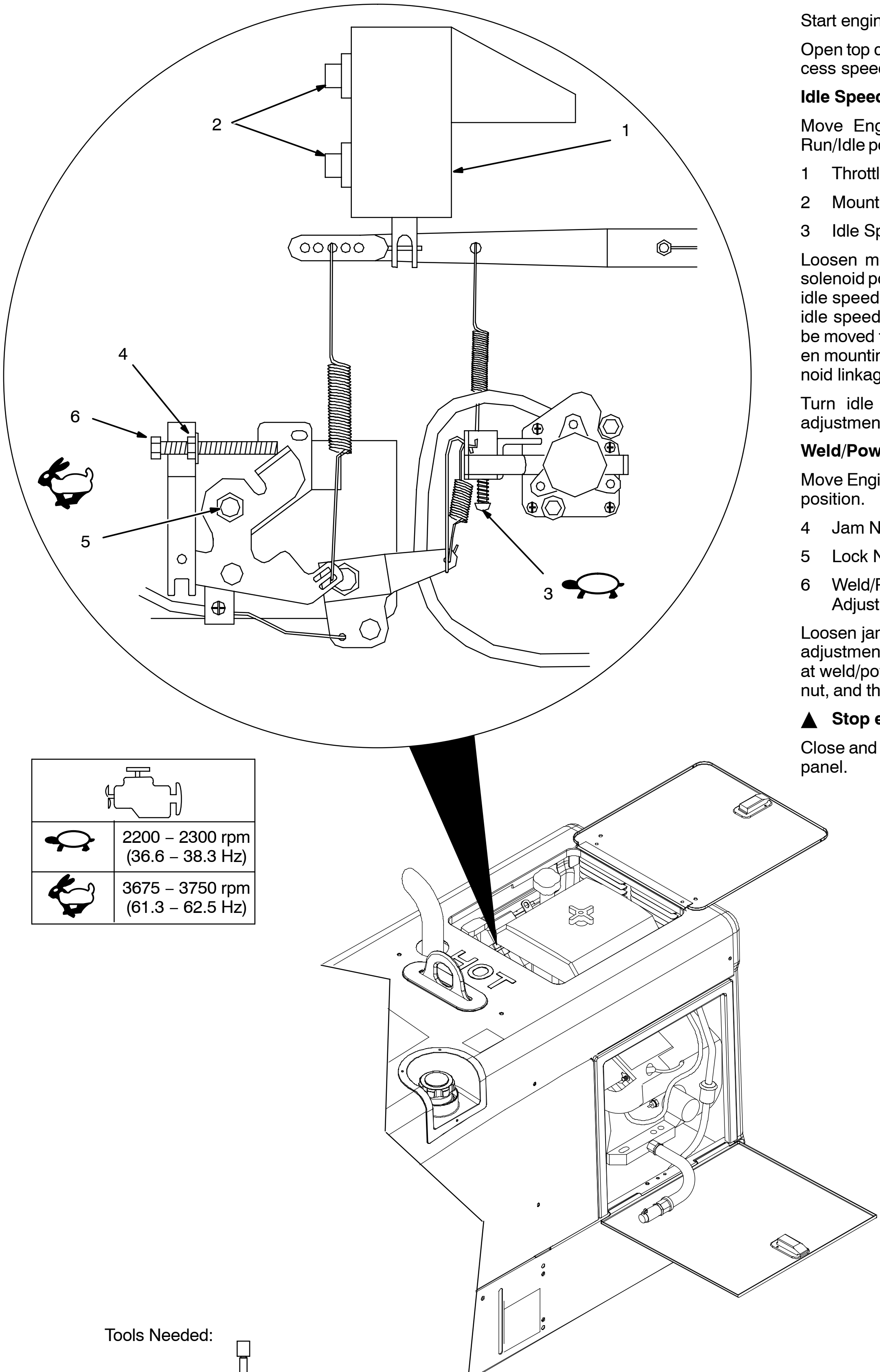
Close and secure top cover access panel.

▲ **Stop engine.**

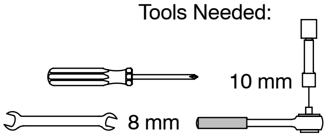
803 573 / 801 209-A

8-8. Adjusting Engine Speed (Robin-Powered Units)





(turtle)	2200 – 2300 rpm (36.6 – 38.3 Hz)
(rabbit)	3675 – 3750 rpm (61.3 – 62.5 Hz)



803 572–A

After tuning engine, check engine speeds with a tachometer (see table). If necessary, adjust speeds as follows:

Start engine and run until warm.

Open top cover access panel to access speed adjustments.

Idle Speed Adjustment

Move Engine Control switch to Run/Idle position.

1 Throttle Solenoid

2 Mounting Screws

3 Idle Speed Screw

Loosen mounting screws. Adjust solenoid position so engine runs at idle speed. If necessary, back out idle speed screw so solenoid can be moved to correct position. Tighten mounting screws. Be sure solenoid linkage works smoothly.

Turn idle speed screw for fine adjustments.

Weld/Power Speed Adjustment

Move Engine Control switch to Run position.

4 Jam Nut

5 Lock Nut

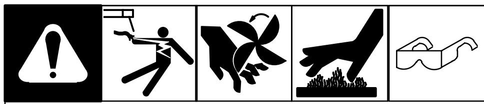
6 Weld/Power Speed Adjustment Screw

Loosen jam nut and lock nut. Turn adjustment screw until engine runs at weld/power speed. Tighten jam nut, and then tighten lock nut.

▲ **Stop engine.**

Close and secure top cover access panel.

8-9. Overload Protection



▲ **Stop engine.**

Open left side door.

☞ *When a supplementary protector or fuse opens, it usually indicates a more serious problem exists. Contact a Factory Authorized Service Agent.*

1 Supplementary Protector CB4

CB4 protects the stator winding supplying 24 volt ac output to Remote receptacle RC4. If CB4 opens, 24 volt ac output to RC4 stops.

☞ *Supplementary protectors CB1 and CB3 protect the stator winding supplying 115 volt ac output to Remote Receptacle RC4 (see Section 7-1).*

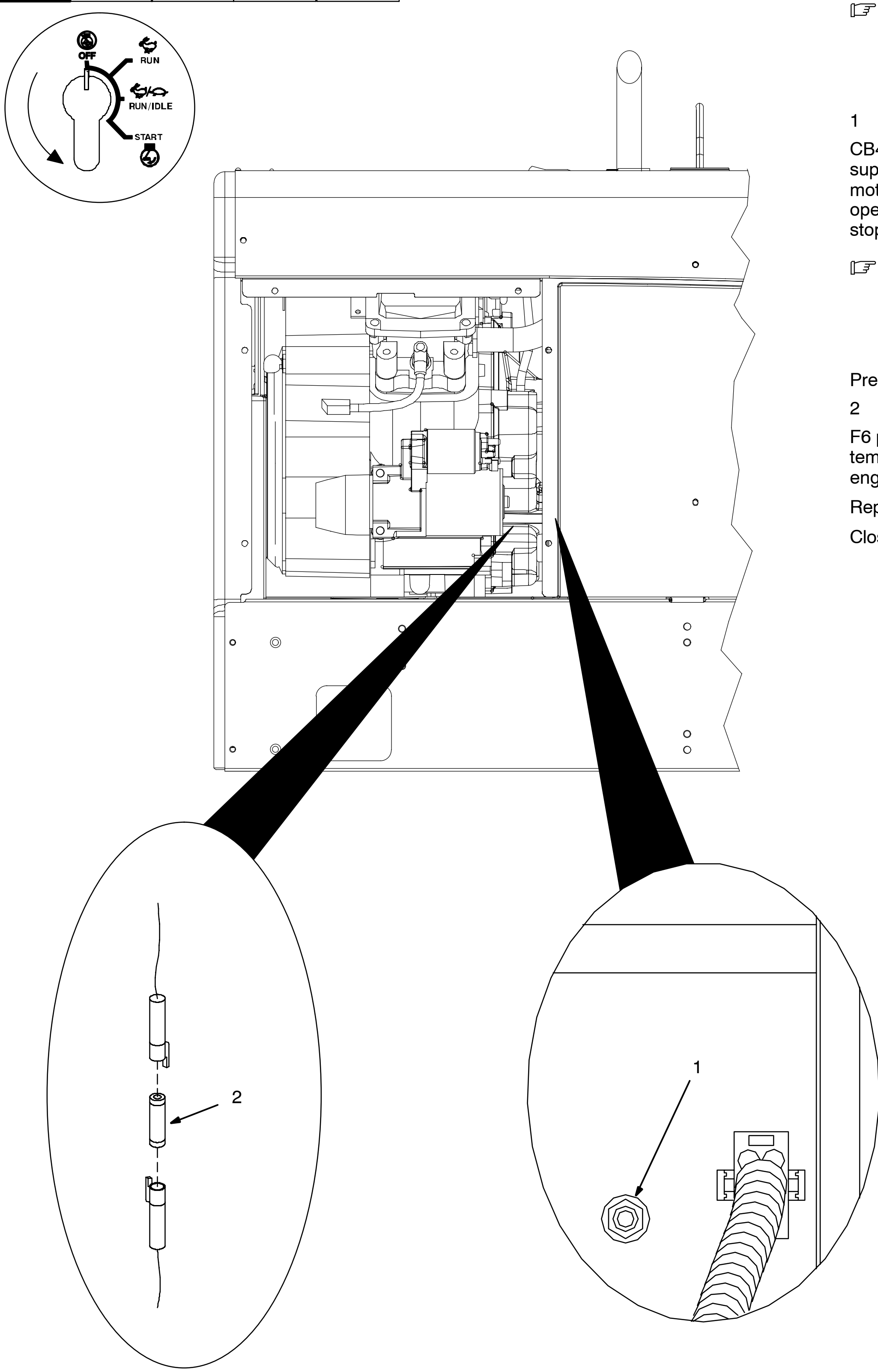
Press button to reset.

2 Fuse F6 (See Parts List)

F6 protects the engine wiring system from overload. If F6 opens, engine will not crank.

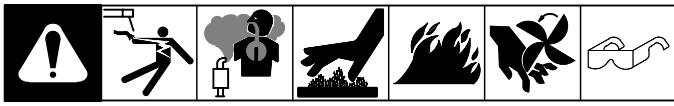
Replace fuse if open.

Close left side door.



803 773–A / Ref. 216 170

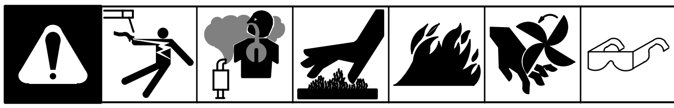
8-10. Welding Troubleshooting



Trouble	Remedy
No weld output.	Check weld control settings.
	Check weld connections.
	Disconnect equipment from generator power receptacles during start-up.
	Increase front panel and/or remote voltage/amperage control settings (see Sections 5-10 and 6-1).
	Check and secure connections to Remote receptacle RC4 (see Sections 5-10).
	Have Factory Authorized Service Agent check brushes, slip rings, and circuit boards PC1 and PC2.
Low weld output.	Check control settings.
	Increase front panel and/or remote voltage/amperage control settings (see Sections 5-10 and 6-1).
	Check and clean air cleaner as necessary (see Section 8-4).
	Check engine speed, and adjust if necessary (see Section 8-7 or 8-8).
	Have Factory Authorized Service Agent check brushes, slip rings, and circuit boards PC1 and PC2.
	See engine manual.
High weld output.	Check control settings.
	Check and adjust engine speed (see Section 8-8 or 8-7).
	Check for obstructed movement of solenoid linkage (see Section 8-7 or 8-8).
	Have Factory Authorized Service Agent check circuit boards PC1 and PC2.
Weld output cannot be adjusted.	Have Factory Authorized Service Agent check field current control board PC2.
Erratic weld output.	Check control settings.
	Clean and tighten connections both inside and outside unit.
	Check and secure lead connections to remote control.
	Be sure connection to work piece is clean and tight.
	Remove excessive coils from weld cables.
	Use dry, properly stored electrodes.
	Check and adjust engine speed (see Section 8-7 or 8-8).
	Have Factory Authorized Service Agent check brushes, slip rings, and circuit boards PC1 and PC2.
	Check shielding gas, ensure proper shielding gas coverage while welding.
No remote voltage/amperage control.	Check and tighten connections to Remote receptacle RC4 (see Section 5-10). Check and secure lead connections to remote control.
No front panel voltage/amperage control.	Disconnect remote control from Remote receptacle RC4 if not needed for weld process (see Section 5-10).
No 24 volt ac power output at Remote receptacle RC4.	Reset supplementary protector CB4 (see Section 8-9).
No 115 volt ac power output at Remote receptacle RC4.	Reset supplementary protector(s) CB1 and/or CB3 (see Section 7-1).
Lack of high frequency; difficulty in establishing Gas Tungsten Arc Welding arc.	Use proper size tungsten for welding amperage.
	Reduce leakage of high frequency from torch or work cable (check grounding, remove excessive coils from weld cables, use shorter weld cables, etc.).
	Check cables and torch for cracked or deteriorated insulation or bad connections. Repair or replace necessary parts.

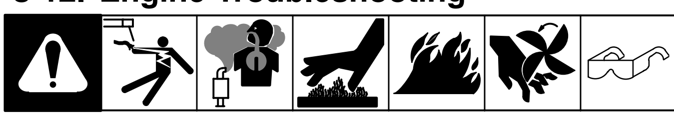
Trouble	Remedy
Wandering arc – poor control of arc direction.	Reduce gas flow rate.
	Select proper size tungsten. Properly prepare tungsten.
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Shield weld zone from drafts.
	Increase postflow time.
	Check and tighten all gas fittings.
	Properly prepare tungsten.

8-11. Generator Power Troubleshooting



Trouble	Remedy
No power output.	Reset supplementary protectors CB1, CB2 and/or CB3 (see Section 7-1).
	Have Factory Authorized Service Agent check brushes, slip rings, and circuit boards PC1 and PC2.
Low power output.	Check and clean air cleaner as necessary.
	Check engine speed, and adjust if necessary (see Section 8-7 or 8-8).
	See engine manual.
High power output.	Check engine speed, and adjust if necessary (see Section 8-7 or 8-8).
Erratic power output.	Have Factory Authorized Service Agent check brushes, slip rings, and field current control board PC2.
	Check receptacle wiring and connections.
	Check governor according to engine manual.

8-12. Engine Troubleshooting



Trouble	Remedy
Engine will not crank.	Check fuse F6, and replace if open (see Section 8-9).
	Check battery voltage.
	Check battery connections and tighten if necessary.
	Check plug PLG5 and plug PLG8 connections.
	Have Factory Authorized Service Agent check Engine Control switch S2.
Engine does not start.	Check fuel level (see Section 5-2 or 5-3).
	Check battery and replace if necessary.
	Check engine charging system according to engine manual.
	Have Factory Authorized Service Agent check fuel shutoff solenoid FS1 according to engine manual.
	See engine manual.
Engine starts but stops when Engine Control switch returns to Run/Idle position.	Check oil level (see Section 5-2 or 5-3). Low oil pressure shutdown stops engine if oil pressure is too low.
	Use correct grade oil for operating temperature. (see Section 8-1).
	Have Factory Authorized Service Agent check low oil pressure shutdown switch S5.

Trouble	Remedy
Battery discharges between uses.	Place Engine Control switch in Off position when unit is not running.
	Clean top of battery with baking soda and water solution; rinse with clear water.
	Periodically recharge battery (approximately every 3 months).
	Replace battery.
	Check voltage regulator according to engine manual.
Engine stopped during normal operation.	Check fuel level (see Section 5-2 or 5-3).
	Check oil level (see Section 5-2 or 5-3). Low oil pressure shutdown stops engine if oil pressure is too low. Oil level too high reduces capacity of the fuel pump.
	Have Factory Authorized Service Agent check fuel shutoff solenoid FS1 according to engine manual.
	Have Factory Authorized Service Agent check low oil pressure shutdown switch S5.
Engine does not return to idle speed.	Be sure Engine Control switch S2 is in Run/Idle position.
	Remove all weld and generator power loads.
	Place Process/Contactor switch in Electrode Hot position or turn off remote contactor. The unit will not return to idle speed when Process/Contactor switch is in a remote position and the remote contactor is on.
	Turn off remote device connected to Remote receptacle RC4 (see Section 5-10).
	Check for obstructed movement of solenoid linkage (see Section 8-7 or 8-8).
	Have Factory Authorized Service Agent check circuit board PC1 and current transformer CT1.
Engine does not remain at weld/power speed when power or weld load is applied with Engine Control switch in Run/Idle position.	Place Engine Control switch in the Run position for small loads.
	Check for obstructed movement of solenoid linkage (see Section 8-7 or 8-8).
During operation in near freezing temperatures, engine starts and goes to idle but stalls after a few minutes.	Treat fuel with isopropyl alcohol de-icer product.
	Place Engine Control switch in the Run position until unit has been in operation and loaded for a period of time.
During operation in severe cold weather, engine starts and goes to idle but stalls after a few minutes.	Install engine manufacturer's kit for cold-weather operation.

SECTION 9 – PARTS LIST

NOTE ☞ *A complete Parts List is available on-line at www.MillerWelds.com.*

9-1. Recommended Spare Parts

Dia. Mkgs.	Part No.	Description	Quantity
		Recommended Spare Parts	
F6	021718	Fuse, Mintr Gl 30. Amp 32 Volt	1
	230015	Tune-up & Filter Kit, **Kohler** (Includes)	1
	230016	.. Air Filter Element	1
	066698	.. Oil Filter	1
	215985	.. Filter, Fuel w/Clamps & 1/4 in Fuel Line	1
	067007	.. Spark Plug	2
	230017	.. Air Filter Wrapper	1
	199062	Tune-up & Filter Kit (**Robin**) (includes)	1
	198755	.. Element, Air Filter	1
	198754	.. Oil Filter	1
	215985	.. Filter/Clamps, Fuel 1/4 in Line	1
	198777	.. Spark Plug	2

Notes

SECTION 10 – ELECTRICAL DIAGRAMS

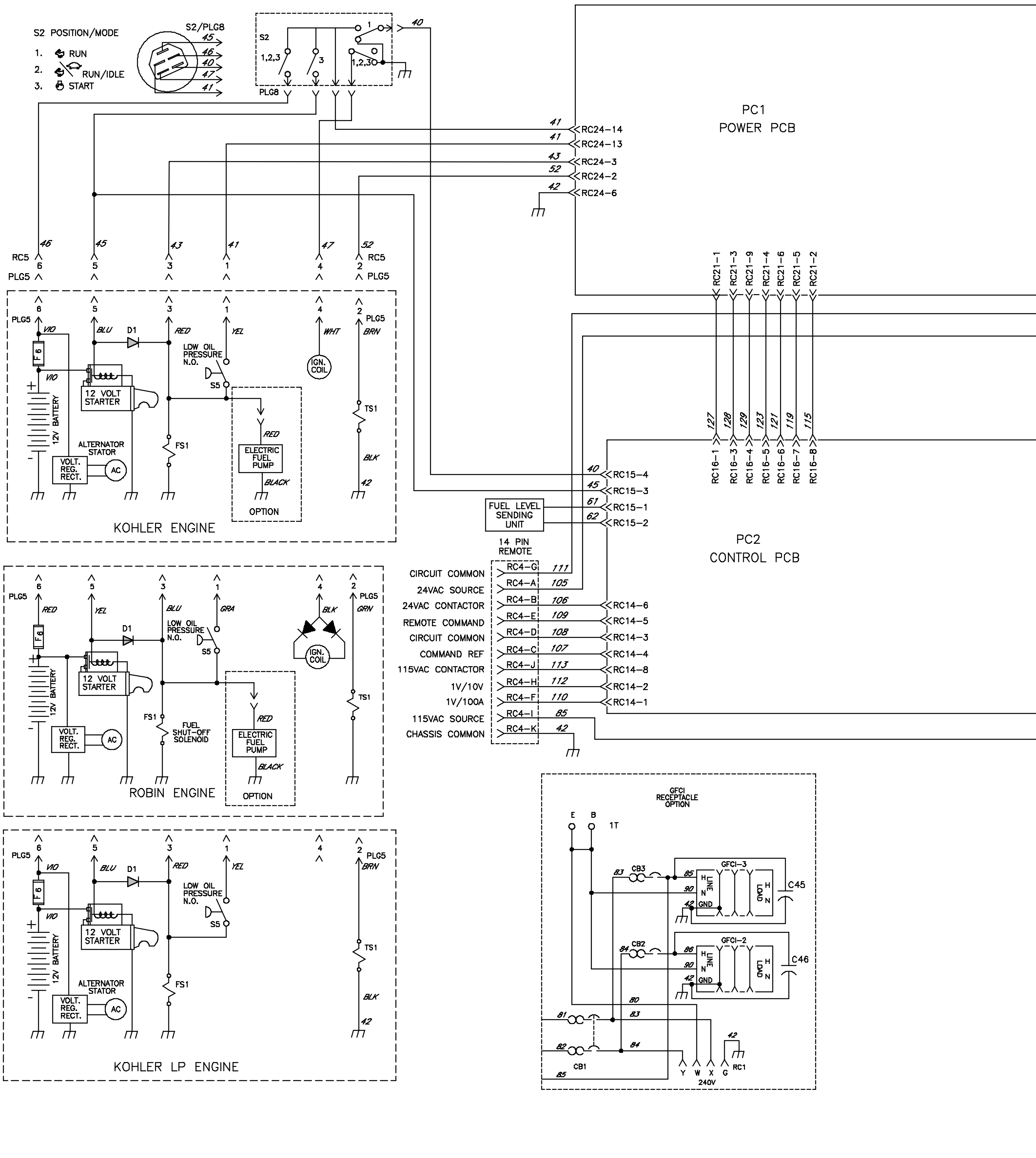
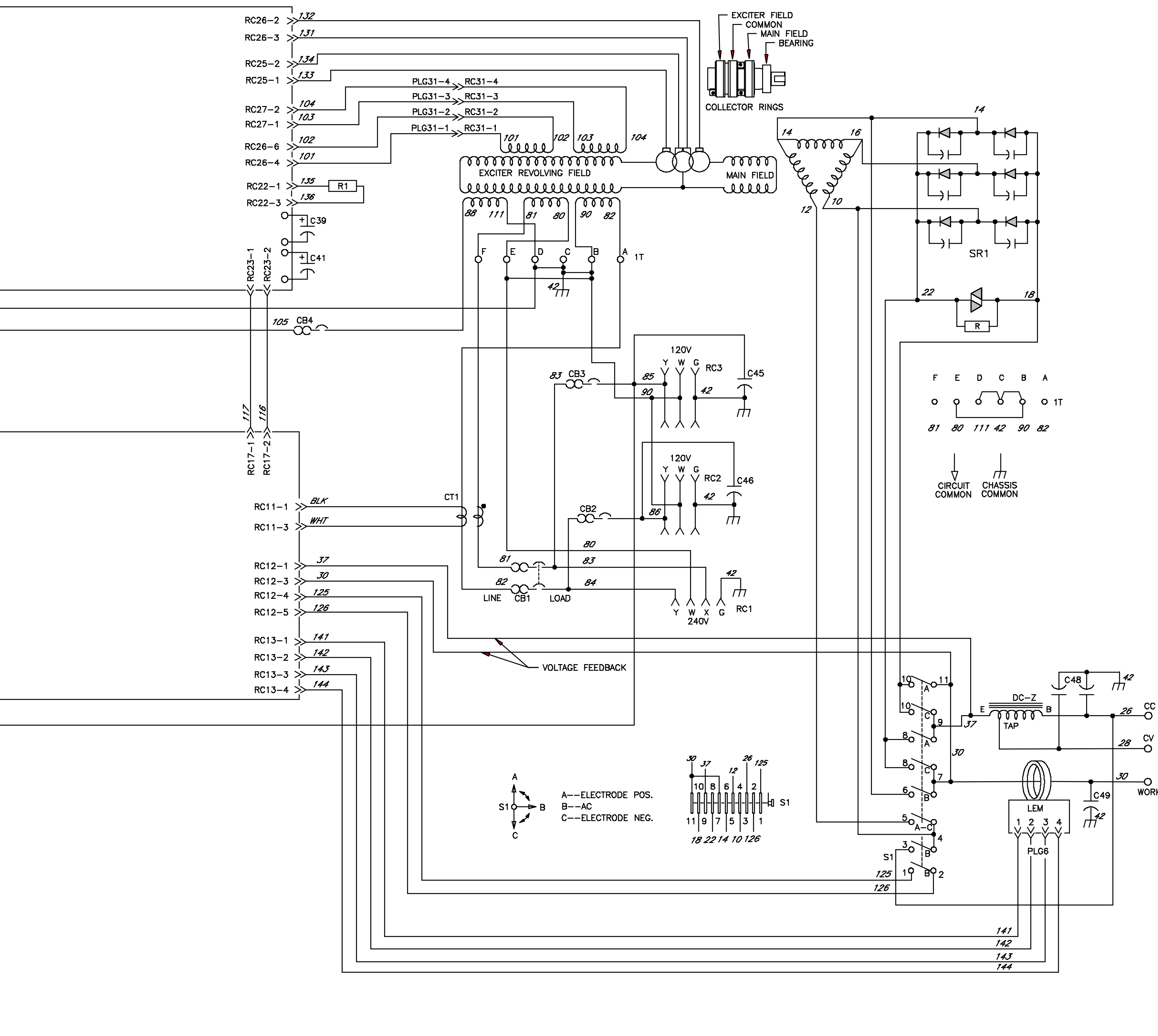


Figure 10-1. Circuit Diagram For Welding Generator Models With AC/DC Output



<table>
<tr><td>⚠ WARNING

ELECTRIC SHOCK HAZARD</td><td>• Do not touch live electrical parts.
• Disconnect input power or stop engine before servicing.
• Do not operate with covers removed.
• Have only qualified persons install, use, or service this unit.</td></tr>
</table>

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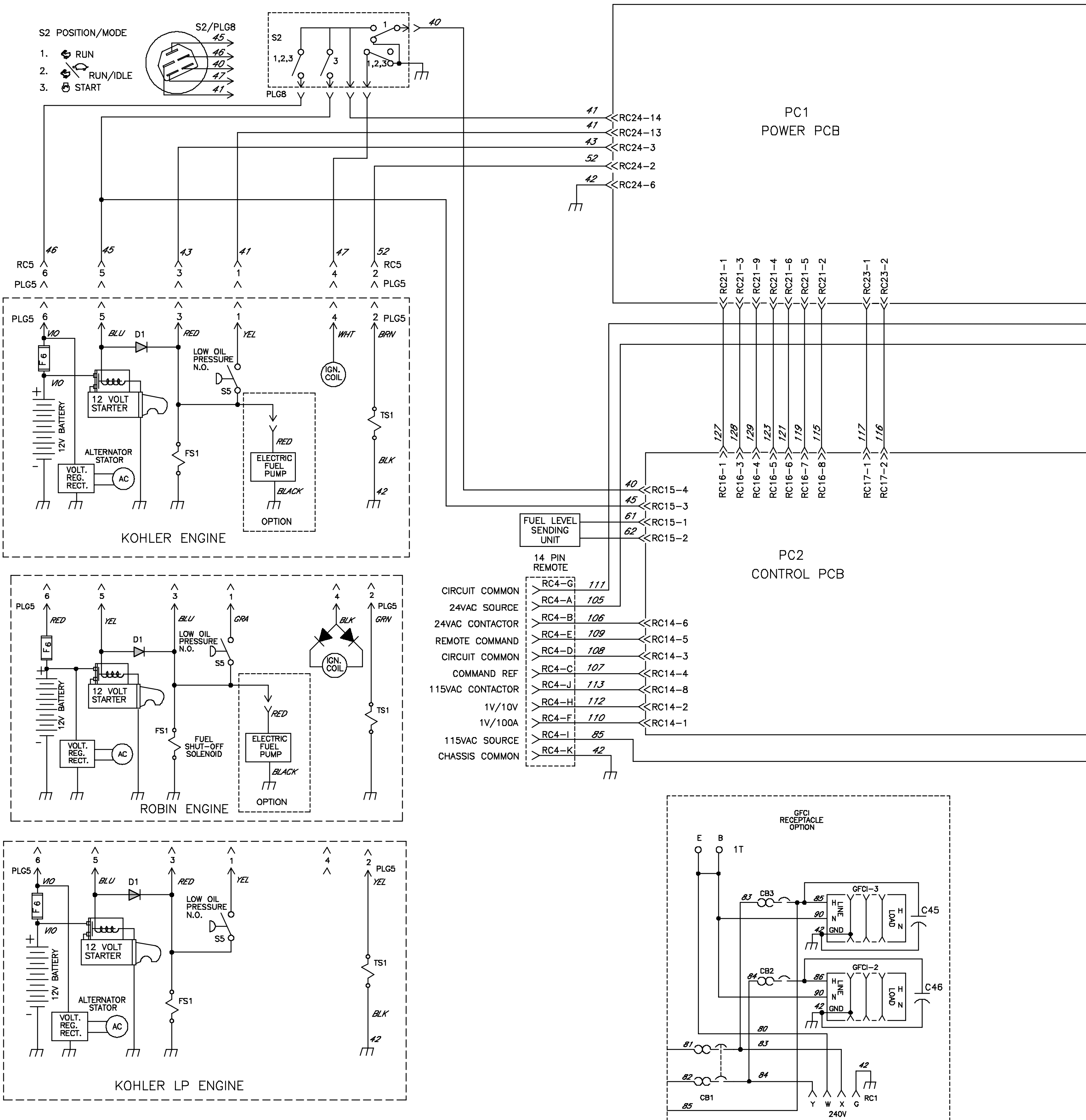
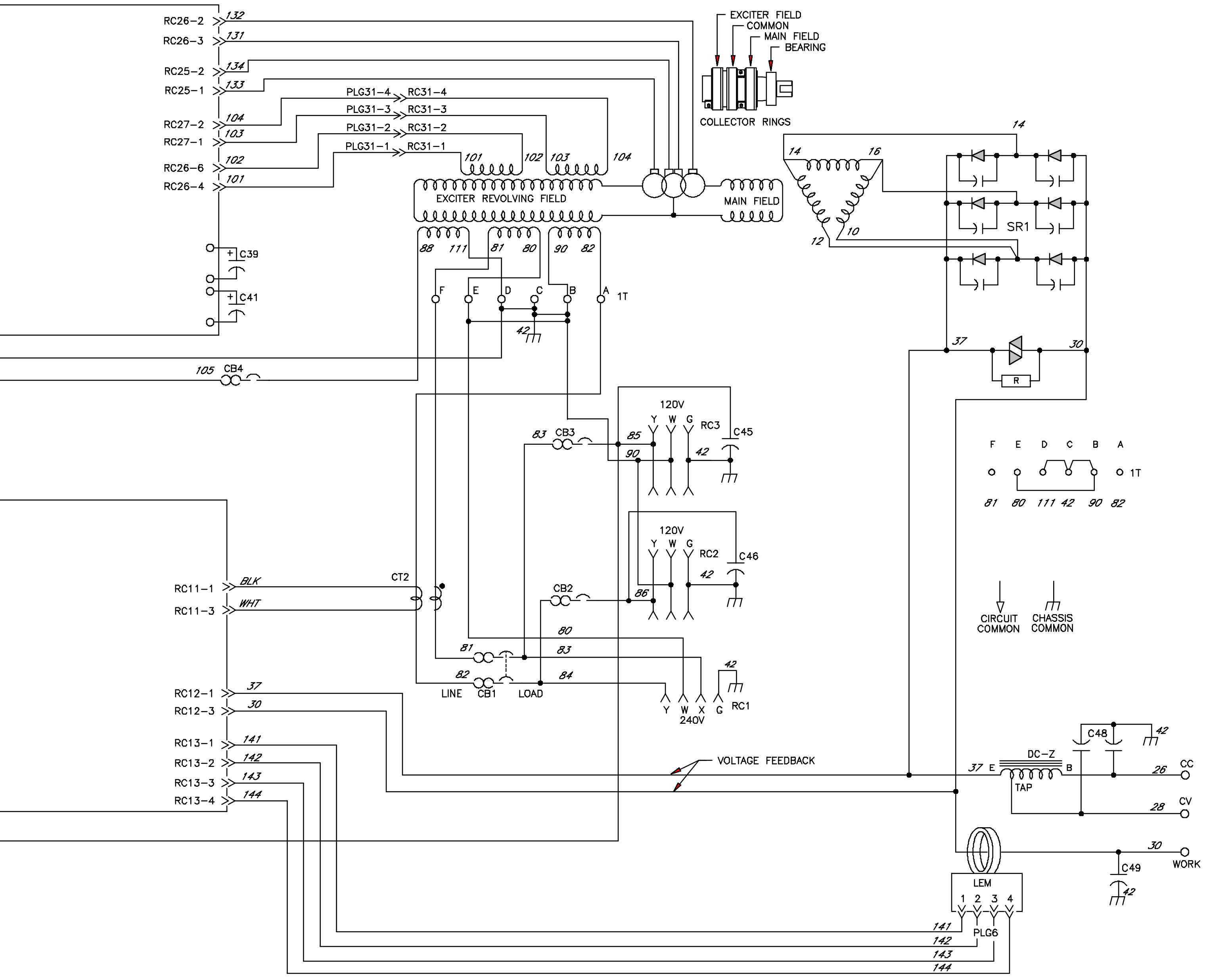


Figure 10-2. Circuit Diagram For Welding Generator Models With DC Output Only



⚠ WARNING

ELECTRIC SHOCK HAZARD

- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.

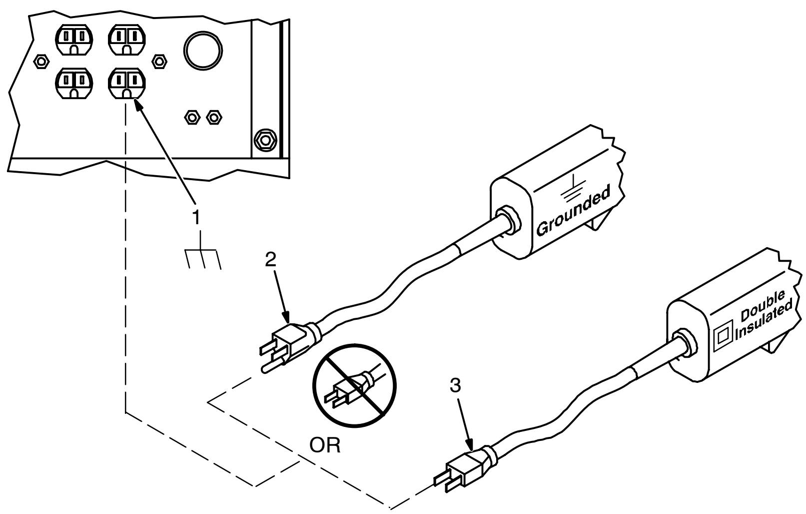
223 713-B

SECTION 11 – GENERATOR POWER GUIDELINES

NOTE *The views in this section are intended to be representative of all engine-driven welding generators. Your unit may differ from those shown.*

11-1. Selecting Equipment





1 Generator Power Receptacles – Neutral Bonded To Frame

2 3-Prong Plug From Case Grounded Equipment

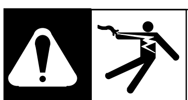
3 2-Prong Plug From Double Insulated Equipment

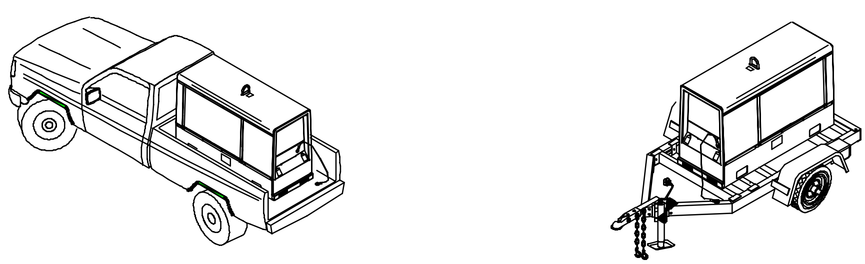
Be sure equipment has double insulated symbol and/or wording on it.

▲ **Do not use 2-prong plug unless equipment is double insulated.**

gen_pwr 10/06 – Ref. ST-159 730 / ST-800 577

11-2. Grounding Generator To Truck Or Trailer Frame





▲ **Always ground generator frame to vehicle frame to prevent electric shock and static electricity hazards.**

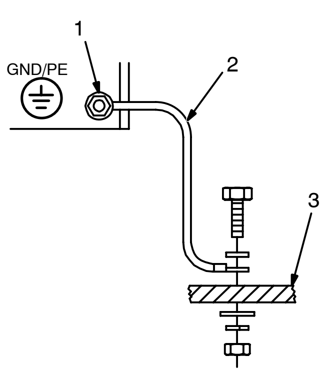
▲ **Also see AWS Safety & Health Fact Sheet No. 29, Grounding of Portable And Vehicle Mounted Welding Generators.**

1 Equipment Grounding Terminal (On Front Panel)

2 Grounding Cable (Not Supplied)

3 Metal Vehicle Frame

Connect cable from equipment ground terminal to metal vehicle frame. Use #10 AWG or larger insulated copper wire.



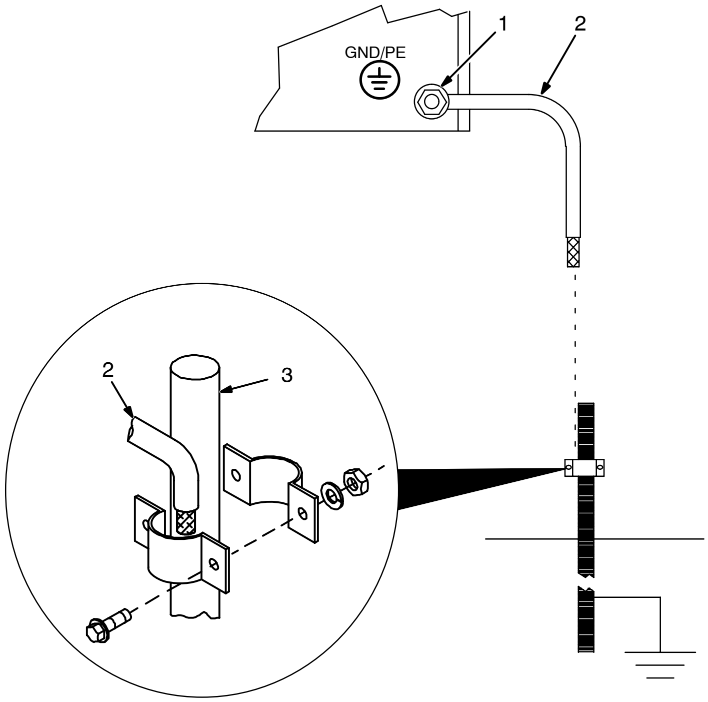
Electrically bond generator frame to vehicle frame by metal-to-metal contact.

▲ **Bed liners, shipping skids, and some running gear insulate the welding generator from the vehicle frame. Always connect a ground wire from the generator equipment grounding terminal to bare metal on the vehicle frame as shown.**

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

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11-3. Grounding When Supplying Building Systems



1 Equipment Grounding Terminal

2 Grounding Cable

Use #10 AWG or larger insulated copper wire.

3 Ground Device

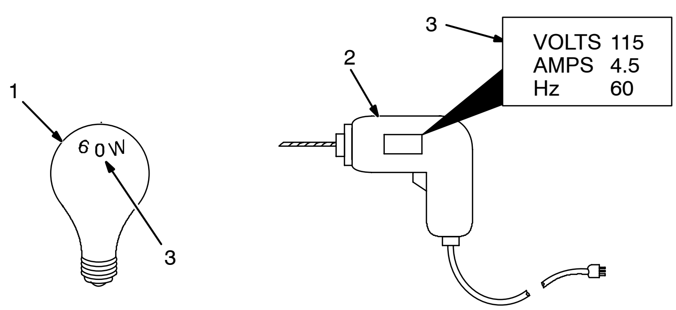
☞ *Use ground device as stated in electrical codes.*

▲ **Ground generator to system earth ground if supplying power to a premises (home, shop, farm) wiring system.**

▲ **Also see AWS Safety & Health Fact Sheet No. 29, Grounding of Portable And Vehicle Mounted Welding Generators.**

ST-800 576-B

11-4. How Much Power Does Equipment Require?



1 Resistive Load

A light bulb is a resistive load and requires a constant amount of power.

2 Non-Resistive Load

Equipment with a motor is a non-resistive load and requires approximately six times more power while starting the motor than when running (see Section 11-8).

3 Rating Data

Rating shows volts and amperes, or watts required to run equipment.

Amperes x Volts = Watts

Example 1: If a drill uses 4.5 amperes at 115 volts, calculate its running power requirement in watts.

4.5 A x 115 V = 520 W

The load applied by the drill is 520 watts.

Example 2: If three 200 watt flood lamps are used with the drill from Example 1, add the individual loads to calculate total load.

(3 x 200W) + 520 W = 1120 W

The total load applied by the three flood lamps and drill is 1120 watts.

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11-5. Approximate Power Requirements For Industrial Motors

Industrial Motors	Rating	Starting Watts	Running Watts
Split Phase	1/8 HP	800	300
	1/6 HP	1225	500
	1/4 HP	1600	600
	1/3 HP	2100	700
	1/2 HP	3175	875
Capacitor Start-Induction Run	1/3 HP	2020	720
	1/2 HP	3075	975
	3/4 HP	4500	1400
	1 HP	6100	1600
	1-1/2 HP	8200	2200
	2 HP	10550	2850
	3 HP	15900	3900
	5 HP	23300	6800
Capacitor Start-Capacitor Run	1-1/2 HP	8100	2000
	5 HP	23300	6000
	7-1/2 HP	35000	8000
	10 HP	46700	10700
Fan Duty	1/8 HP	1000	400
	1/6 HP	1400	550
	1/4 HP	1850	650
	1/3 HP	2400	800
	1/2 HP	3500	1100

11-6. Approximate Power Requirements For Farm/Home Equipment

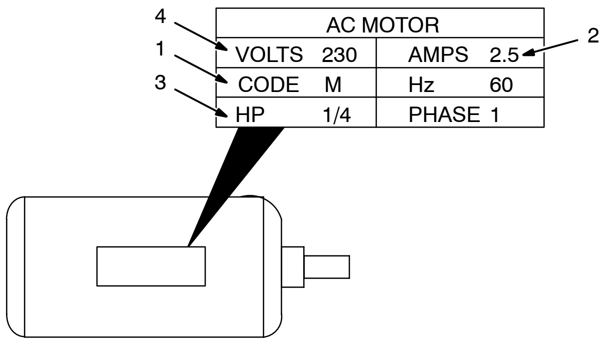
Farm/Home Equipment	Rating	Starting Watts	Running Watts
Stock Tank De-Icer		1000	1000
Grain Cleaner	1/4 HP	1650	650
Portable Conveyor	1/2 HP	3400	1000
Grain Elevator	3/4 HP	4400	1400
Milk Cooler		2900	1100
Milker (Vacuum Pump)	2 HP	10500	2800
FARM DUTY MOTORS	1/3 HP	1720	720
Std. (e.g. Conveyors,	1/2 HP	2575	975
Feed Augers, Air	3/4 HP	4500	1400
Compressors)	1 HP	6100	1600
	1-1/2 HP	8200	2200
	2 HP	10550	2850
	3 HP	15900	3900
	5 HP	23300	6800
High Torque (e.g. Barn	1-1/2 HP	8100	2000
Cleaners, Silo Unloaders,	5 HP	23300	6000
Silo Hoists, Bunk Feeders)	7-1/2 HP	35000	8000
	10 HP	46700	10700
3-1/2 cu. ft. Mixer	1/2 HP	3300	1000
High Pressure 1.8 Gal/Min	500 PSI	3150	950
Washer 2 gal/min	550 PSI	4500	1400
2 gal/min	700 PSI	6100	1600
Refrigerator or Freezer		3100	800
Shallow Well Pump	1/3 HP	2150	750
	1/2 HP	3100	1000
Sump Pump	1/3 HP	2100	800
	1/2 HP	3200	1050

11-7. Approximate Power Requirements For Contractor Equipment

Contractor	Rating	Starting Watts	Running Watts
Hand Drill	1/4 in	350	350
	3/8 in	400	400
	1/2 in	600	600
Circular Saw	6-1/2 in	500	500
	7-1/4 in	900	900
	8-1/4 in	1400	1400
Table Saw	9 in	4500	1500
	10 in	6300	1800
Band Saw	14 in	2500	1100
Bench Grinder	6 in	1720	720
	8 in	3900	1400
	10 in	5200	1600
Air Compressor	1/2 HP	3000	1000
	1 HP	6000	1500
	1-1/2 HP	8200	2200
	2 HP	10500	2800
Electric Chain Saw	1-1/2 HP, 12 in	1100	1100
	2 HP, 14 in	1100	1100
Electric Trimmer	Standard 9 in	350	350
	Heavy Duty 12 in	500	500
Electric Cultivator	1/3 HP	2100	700
Elec. Hedge Trimmer	18 in	400	400
Flood Lights	HID	125	100
	Metal Halide	313	250
	Mercury	1000	
	Sodium	1400	
	Vapor	1250	1000
Submersible Pump	400 gph	600	200
Centrifugal Pump	900 gph	900	500
Floor Polisher	3/4 HP, 16 in	4500	1400
	1 HP, 20 in	6100	1600
High Pressure Washer	1/2 HP	3150	950
	3/4 HP	4500	1400
	1 HP	6100	1600
55 gal Drum Mixer	1/4 HP	1900	700
Wet & Dry Vac	1.7 HP	900	900
	2-1/2 HP	1300	1300

11-8. Power Required To Start Motor

Single-Phase Induction Motor Starting Requirements								
Motor Start Code	G	H	J	K	L	M	N	P
KVA/HP	6.3	7.1	8.0	9.0	10.0	11.2	12.5	14.0



1 Motor Start Code
2 Running Amperage
3 Motor HP
4 Motor Voltage

To find starting amperage:

Step 1: Find code and use table to find kVA/HP. If code is not listed, multiply running amperage by six to find starting amperage.

Step 2: Find Motor HP and Volts.

Step 3: Determine starting amperage (see example).

Welding generator amperage output must be at least twice the motor's running amperage.

(kVA/HP x HP x 1000) / Volts = Starting Amperage

Example: Calculate starting amperage required for a 230 V, 1/4 HP motor with a motor start code of M.

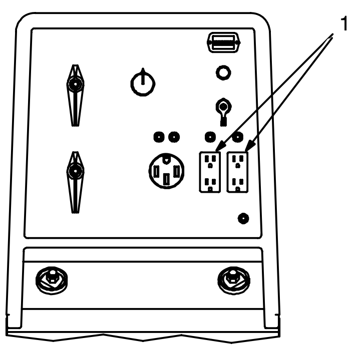
Volts = 230, HP = 1/4, kVA/HP = 11.2

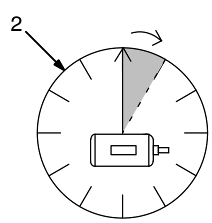
(11.2 x 1/4 x 1000) / 230 = 12.2A

Starting the motor requires 12.2 amperes.

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11-9. How Much Power Can Generator Supply?





1 Limit Load To 90% Of Generator Output

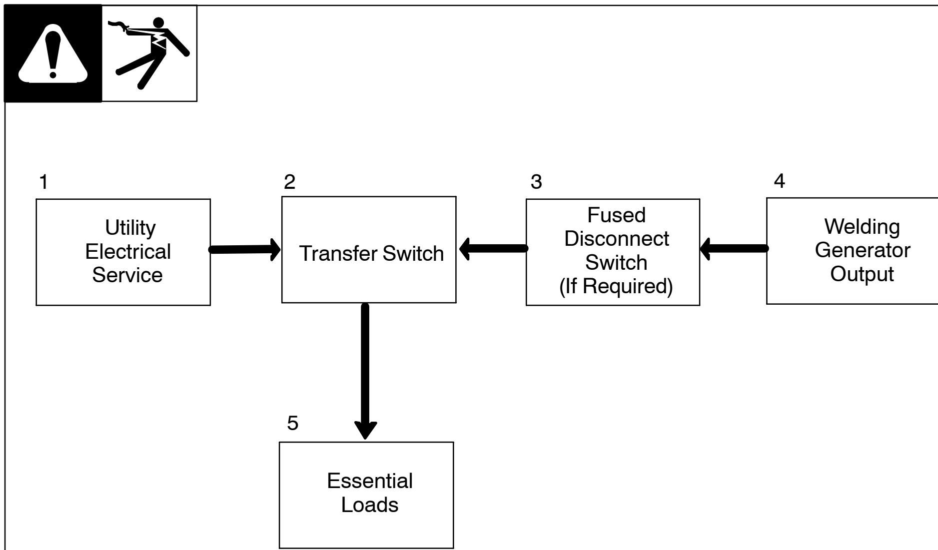
Always start non-resistive (motor) loads in order from largest to smallest, and add resistive loads last.

2 5 Second Rule

If motor does not start within 5 seconds, turn off power to prevent motor damage. Motor requires more power than generator can supply.

Ref. ST-800 396-A / S-0625

11-10. Typical Connections To Supply Standby Power



▲ **Have only qualified persons perform these connections according to all applicable codes and safety practices.**

▲ **Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.**

☞ *Customer-supplied equipment is required if generator will supply standby power during emergencies or power outages.*

1 Utility Electrical Service

2 Transfer Switch (Double-Throw)

Switch transfers the electrical load from electric utility service to the generator. Transfer load back to electric utility when service is restored.

Install correct switch (customer-supplied). Switch rating must be same as or greater than the branch overcurrent protection.

3 Fused Disconnect Switch

Install correct switch (customer-supplied) if required by electrical code.

4 Welding Generator Output

Generator output voltage and wiring must be consistent with regular (utility) system voltage and wiring.

Connect generator with temporary or permanent wiring suitable for the installation.

Turn off or unplug all equipment connected to generator before starting or stopping engine. When starting or stopping, the engine has low speed which causes low voltage and frequency.

5 Essential Loads

Generator output may not meet the electrical requirements of the premises. If generator does not produce enough output to meet all requirements, connect only essential loads (pumps, freezers, heaters, etc. – See Section 11-4).

11-11. Selecting Extension Cord (Use Shortest Cord Possible)



Cord Lengths for 120 Volt Loads

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

Current (Amperes)	Load (Watts)	Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)*					
		4	6	8	10	12	14
5	600			350 (106)	225 (68)	137 (42)	100 (30)
7	840		400 (122)	250 (76)	150 (46)	100 (30)	62 (19)
10	1200	400 (122)	275 (84)	175 (53)	112 (34)	62 (19)	50 (15)
15	1800	300 (91)	175 (53)	112 (34)	75 (23)	37 (11)	30 (9)
20	2400	225 (68)	137 (42)	87 (26)	50 (15)	30 (9)	
25	3000	175 (53)	112 (34)	62 (19)	37 (11)		
30	3600	150 (46)	87 (26)	50 (15)	37 (11)		
35	4200	125 (38)	75 (23)	50 (15)			
40	4800	112 (34)	62 (19)	37 (11)			
45	5400	100 (30)	62 (19)				
50	6000	87 (26)	50 (15)				

*Conductor size is based on maximum 2% voltage drop

Cord Lengths for 240 Volt Loads

▲ **If unit does not have GFCI receptacles, use GFCI-protected extension cord.**

Current (Amperes)	Load (Watts)	Maximum Allowable Cord Length in ft (m) for Conductor Size (AWG)*					
		4	6	8	10	12	14
5	1200			700 (213)	450 (137)	225 (84)	200 (61)
7	1680		800 (244)	500 (152)	300 (91)	200 (61)	125 (38)
10	2400	800 (244)	550 (168)	350 (107)	225 (69)	125 (38)	100 (31)
15	3600	600 (183)	350 (107)	225 (69)	150 (46)	75 (23)	60 (18)
20	4800	450 (137)	275 (84)	175 (53)	100 (31)	60 (18)	
25	6000	350 (107)	225 (69)	125 (38)	75 (23)		
30	7000	300 (91)	175 (53)	100 (31)	75 (23)		
35	8400	250 (76)	150 (46)	100 (31)			
40	9600	225 (69)	125 (38)	75 (23)			
45	10,800	200 (61)	125 (38)				
50	12,000	175 (53)	100 (31)				

*Conductor size is based on maximum 2% voltage drop

TRUE BLUE® WARRANTY

Effective January 1, 2007
(Equipment with a serial number preface of "LH" or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

Warranty Questions?

Call
1-800-4-A-MILLER
for your local
Miller distributor.

Your distributor also gives you ...

Service
You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

Support
Need fast answers to the tough welding questions? Contact your distributor. The expertise of the distributor and Miller is there to help you, every step of the way.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the delivery date of the equipment to the original end-user purchaser, and not to exceed one year after the equipment is shipped to a North American distributor or eighteen months after the equipment is shipped to an International distributor.

1. 5 Years Parts — 3 Years Labor
   * Original main power rectifiers
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Process Controllers
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Sources (Unless Otherwise Stated)
   * Water Coolant Systems (Integrated)
   * Intellitig
   * Engine Driven Welding Generators
     (NOTE: Engines are warranted separately by the engine manufacturer.)
3. 1 Year — Parts and Labor Unless Specified
   * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources, Coolers, and Electronic
     Controls/Recorders
   * Water Coolant Systems (Non-Integrated)
   * Flowgauge and Flowmeter Regulators (No Labor)
   * HF Units
   * Grids
   * Spot Welders
   * Load Banks
   * Arc Stud Power Sources & Arc Stud Guns
   * Racks
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options
     (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
   * Bernard-Branded Mig Guns (No Labor)
   * Weldcraft-Branded TIG Torches (No Labor)
   * Subarc Wire Drive Assemblies
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches and Subarc (SAW) Guns
   * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
   * APT & SAF Model Plasma Cutting Torches
   * Remote Controls
   * Accessory (Kits)
   * Replacement Parts (No labor)
   * Spoolmate Spoolguns
   * Canvas Covers

Miller's True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear. (Exception: brushes, slip rings, and relays are covered on Bobcat, Trailblazer, and Legend models.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

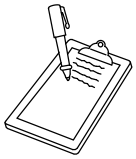
TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.

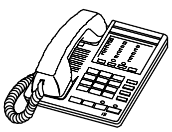
Miller®



Owner's Record

Please complete and retain with your personal records.

Model Name	Serial/Style Number
Purchase Date	(Date which equipment was delivered to original customer.)
Distributor	
Address	
City	
State	Zip



For Service

Contact a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:	Welding Supplies and Consumables Options and Accessories Personal Safety Equipment Service and Repair Replacement Parts Training (Schools, Videos, Books) Technical Manuals (Servicing Information and Parts) Circuit Diagrams Welding Process Handbooks To locate a Distributor or Service Agency visit www.millerwelds.com or call 1-800-4-A-Miller
Contact the Delivering Carrier to:	File a claim for loss or damage during shipment. For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

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